MODEL AIRPLANE NEWS

JANUARY 1948 • 25 CENTS

assie Free Flight Contest Winner ... *page 9*

odel Motors for 1948 COMPLETE ANALYSIS OF ALL MODEL POWERPLANTS NOW AVAILABLE INCL. GAS, JET, DIESEL & CO2 ... *page 16*


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MODEL AIRPLANE NEWS

JAY P. CLEVELAND
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JANUARY 1948 VOL. XXXVIII No. 1

CONTENTS

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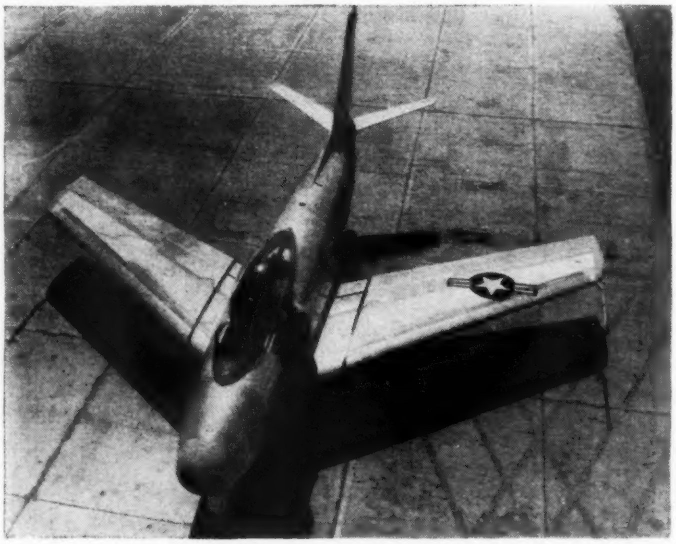
U. S. AIR FORCE received its new name and now has completed most of its top structure except for the one major post: Chief of Staff. Gen. Carl Spaatz, present holder of post, is definitely slated for retirement and the appointment of his successor has long been a press football with the names of (then) Lieut. Gen. Hoyt S. Vandenberg and Lieut. Gen. George C. Kenney most prominently mentioned. The new AF alignment, however, has promoted Vandenberg to full general and made him Vice Chief of Staff, thereby slating him almost certainly as Spaatz' successor. Kenney remains, however, as commanding general of the Strategic Air Command, the top field post.

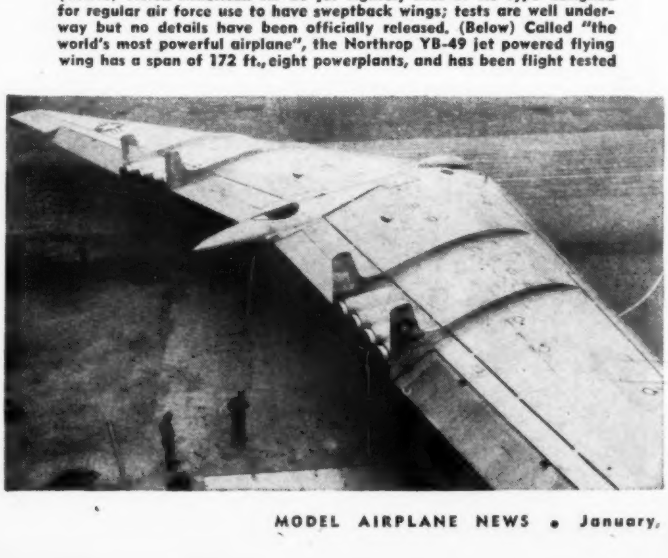
SHAKE-UP IN TOP Air Force jobs was thoroughly done. Lieut. Gen. Nathan Twining, formerly c.g. of Air Materiel Command, was assigned to Alaska and Lieut. Gen. Curtis E. LeMay, formerly head of AAF Research and Development, was assigned to head USAF in Europe. A major shift in emphasis was the appointment of Gen. Joseph B. McNarney to commanding general of Air Materiel Command, the first full general to hold the office. Maj. Gen. Lauris Norstad was shifted from his post on Army General Staff and returned to Air Force as Deputy Chief of Staff for Operations.

FIRM CIVILIAN control of the new Air Force is assured by Secretary of Air Force W. Stuart Symington. He recently named

(*Turn to page 76*)



(Above) North American XP-86 jet fighter, first of its type designed for regular air force use to have sweptback wings; tests are well underway but no details have been officially released. (Below) Called "the world's most powerful airplane", the Northrop YB-49 jet powered flying wing has a span of 172 ft., eight powerplants, and has been flight tested



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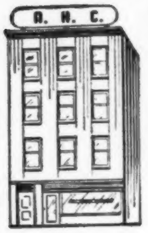

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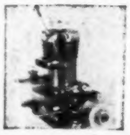

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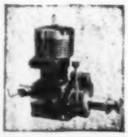

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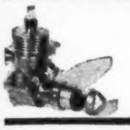

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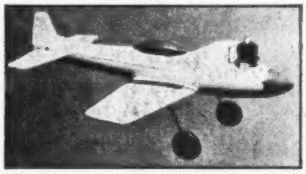

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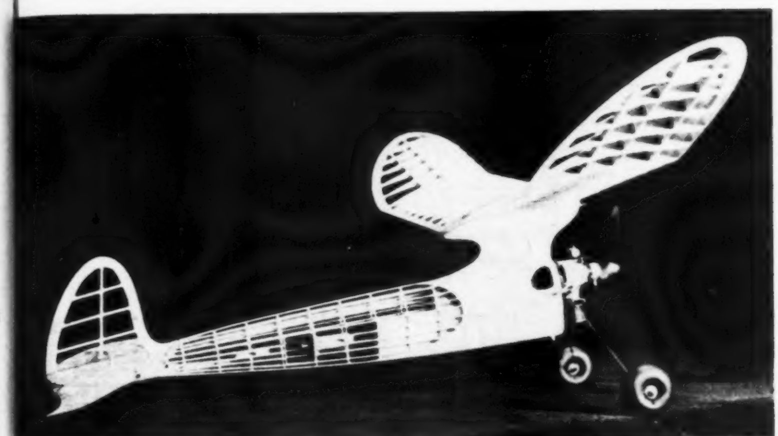
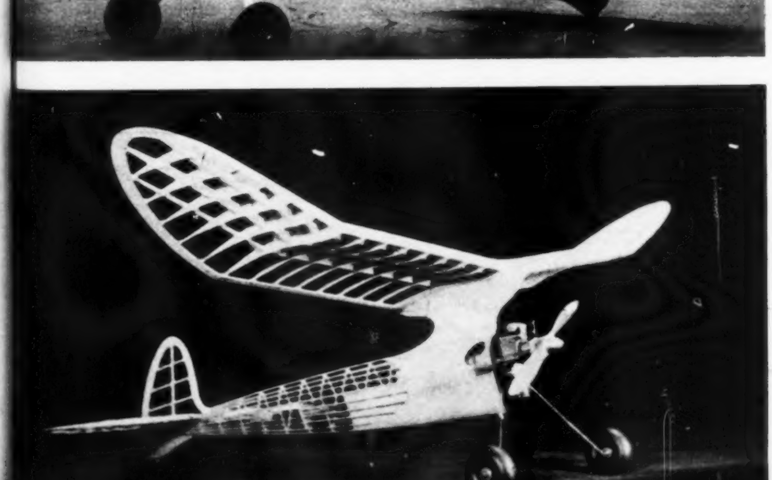




HOOPLA

by JOHN L. MACKENZIE

WHILE the battle rages between exponents of the pylon and non-pylon types of models, we take pleasure in presenting one of the season's top models in the former class. We do not wish to enter the controversy, but merely want to state that this little ship has been delivering the goods in Class A during past and current seasons. It derives its name from its designer, Eldred Hoopengarner, one of the top free flight men in the northern Ohio area.

Hoopla features a foolproof dethermalizer which really does the trick. The superiority of this type of timing device lies in the fact that it does not alter the model's tail adjustment.

A simple and unique type of construction makes *Hoopla* a desirable ship for your building schedule. The radial mounting of the engine and removable ignition unit are unique. The concentration of weight and strength at the front of the model makes it highly resistant to damage when striking another object.

Let us also call your attention to the fact that our plans are presented in such a way that no drafting or enlarging is necessary for the model builder.

To date four of these models have been built using different classes and makes of engines, and all have had the same superb flying characteristics.

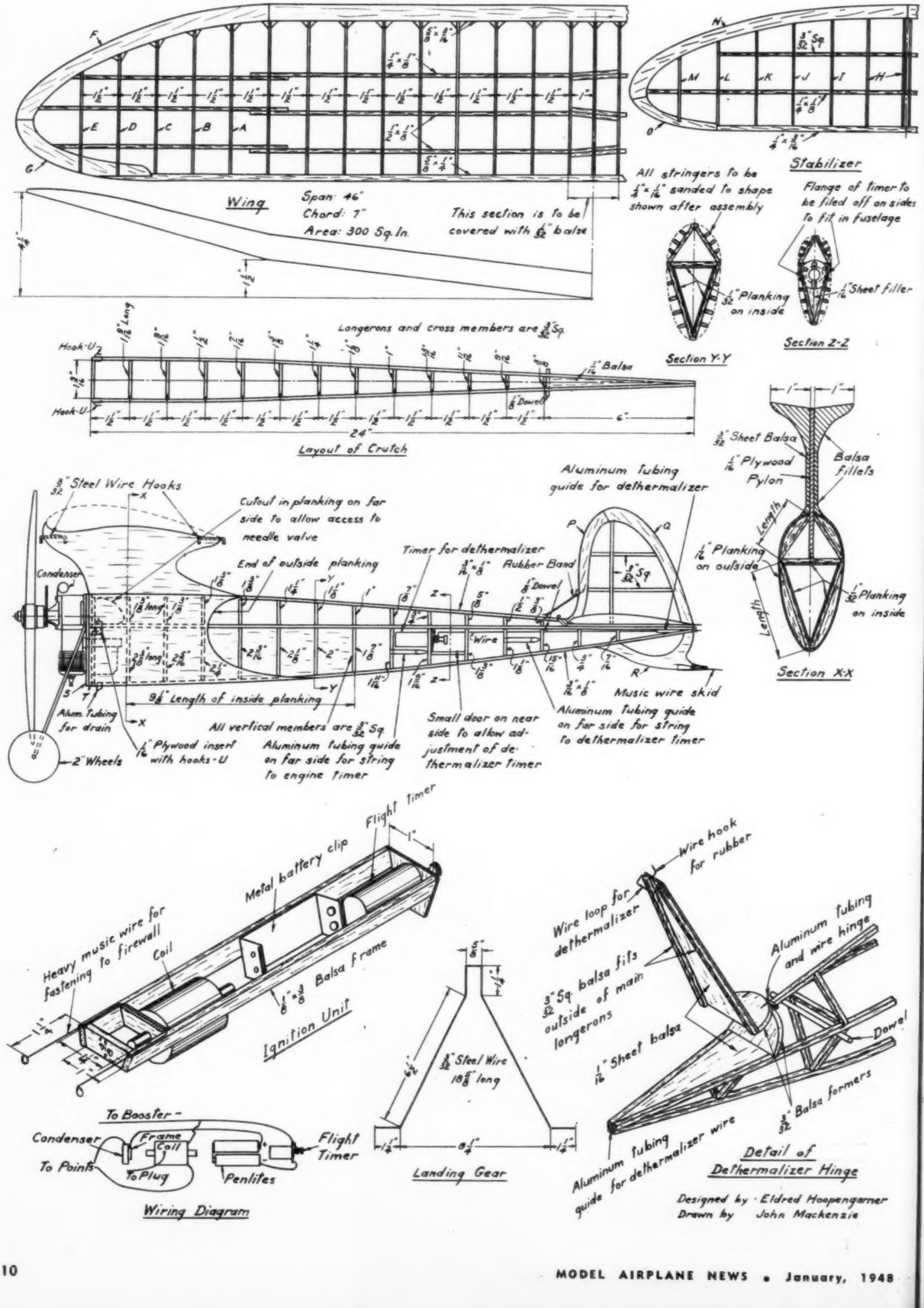
Study the drawings before starting construction. Using the dimensions given on the drawings, assemble the crutch on your work board. As this is the main section of the fuselage, be sure it is correct and well built. Leaving the crutch on your work board, starting from the front and working toward the rear, build the bottom section of the fuselage right on the crutch. When this is completed, remove it from your work board and build the top section in the same manner. Next fit in the piece of aluminum tubing for the dethermalizer, cementing it well. At this point the fuselage will be diamond shaped. Now cut the three pieces of 1/32" flat for the inside planking and cement in place.

The pylon stiffener is next cut from 1/16" aircraft plywood. Cement it in place, making sure it is perpendicular to the crutch. Now make a 3/32" T former from balsa wood and cement in place; this former will *not* have room for the bolt holes. Next make another T former from 1/16" aircraft plywood. Cement this in place, making sure it is aligned with the fuselage. Now, using soft 3/32" balsa, make formers that will be used to support the outside planking. Sand these to the correct shape after cementing in place. These will be on the first four uprights.

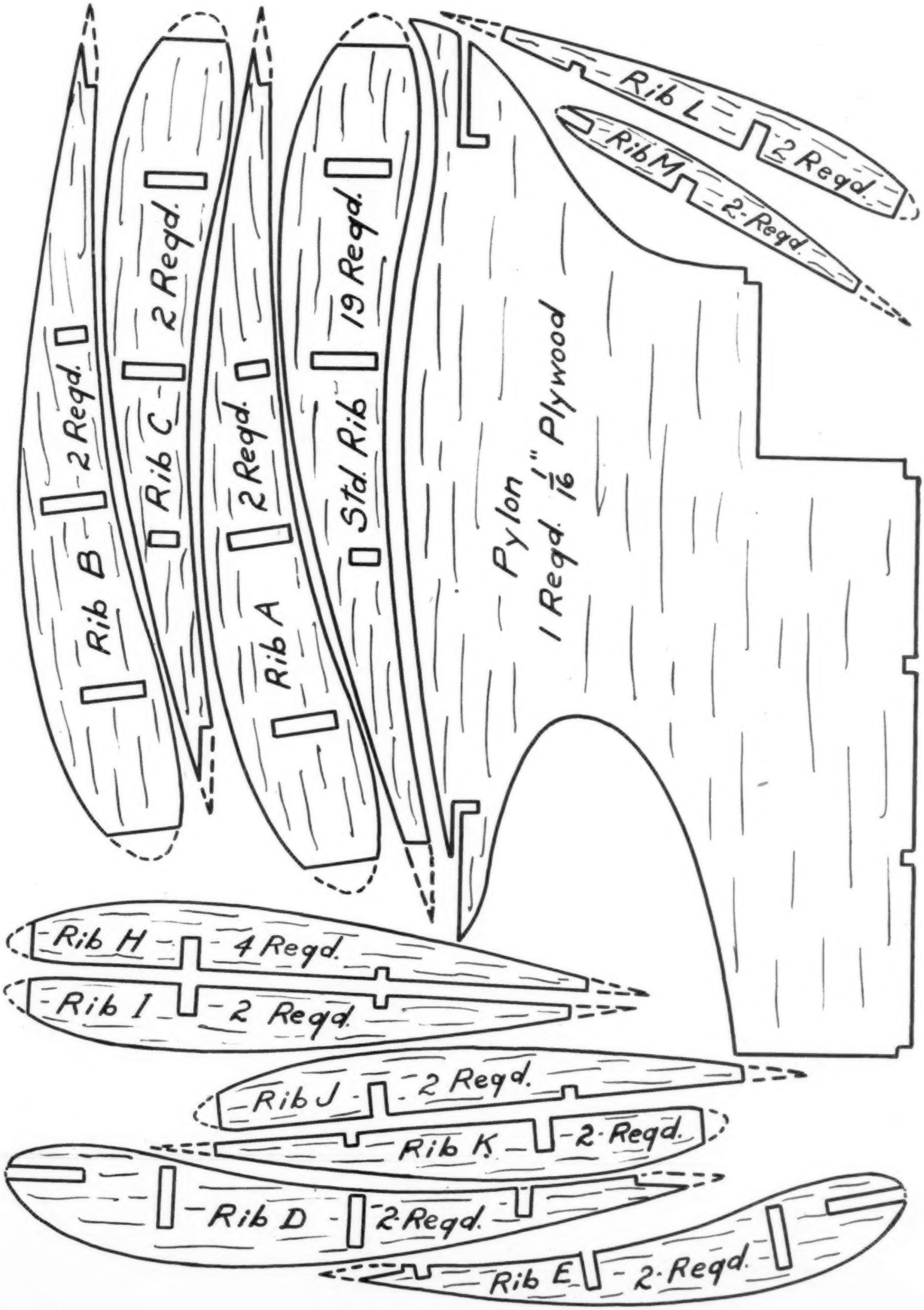
For the dethermalizer, use an Austin flight timer. It will have to be cut down to fit the fuselage but this will not interfere with the operation of the timer. Cement this in place as shown on the drawings.

Cement medium hard 1/8" flat balsa to each side of the pylon with the grain running as shown on drawings. This will give a laminated section of balsa, plywood and balsa for the pylon. For planking the outside of the fuselage it was found that 1/8" by 1/16" strip balsa gives the best results due to the contour of the fuselage. Cut the outline shape of the planking after it is completely planked. Now using 1/16" by 1/4" strip balsa make the fuselage stringers. Butt these up to the planking, then sand to shape when dry. They are sanded so that they taper as shown on drawings. The fillets, which are soft balsa, are then cemented in place and sanded to shape as shown.

(*Turn to page* 48)



Designed by - Eldred Hoopengarner
Drawn by John Mackenzie


Rib B
2 Reqd.
Rib C
2 Reqd.
Rib A
2 Reqd.
Std. Rib
19 Reqd.
Pylon
1 Reqd. 1/16" Plywood
Rib L
2 Reqd.
Rib M
2-Reqd.
Rib H
4 Reqd.
Rib I
2 Reqd.
Rib J
2 Reqd.
Rib K
2-Reqd.
Rib D
2-Reqd.
Rib E
2-Reqd.

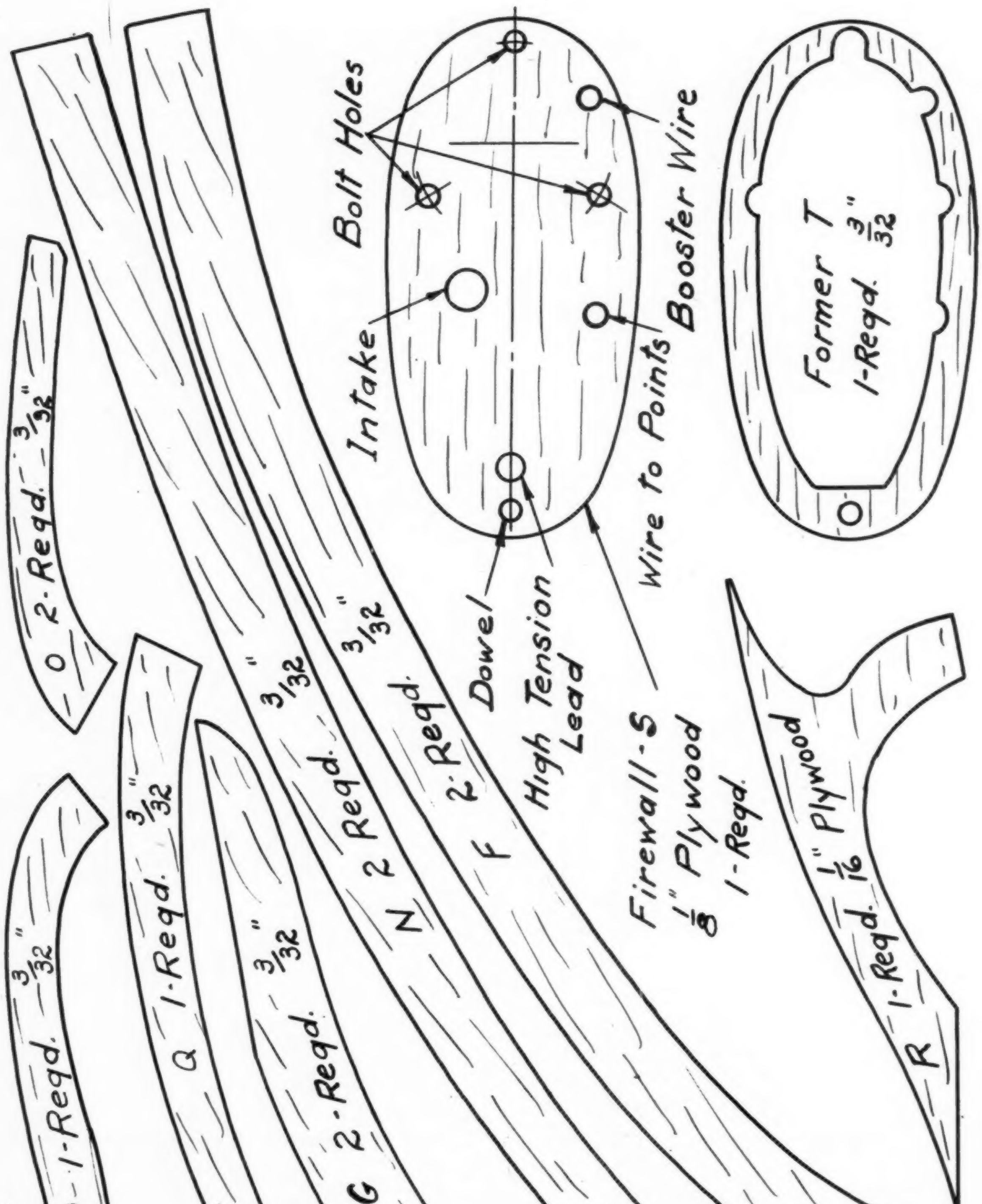

P 1-Reqd. 3/32"
Q 1-Reqd. 3/32"
G 2-Reqd. 3/32"
N 2 Reqd. 3/32"
F 2-Reqd. 3/32"
O 2-Reqd. 3/32"
Bolt Holes
Intake
Booster Wire
Wire to Points
Dowel
High Tension Lead
Firewall-S 1/8" Plywood 1-Reqd.
R 1-Reqd. 1/16" Plywood
Former T 1-Reqd. 3/32"

FIG. 1

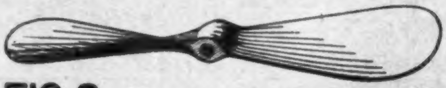


FIG. 2

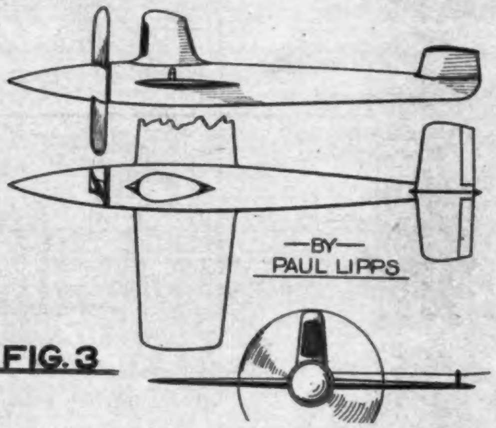


FIG. 3

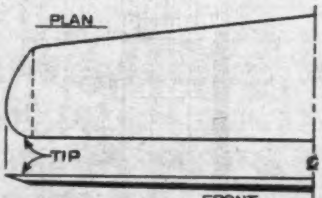


FIG. 4


FIG. 5


FIG. 6

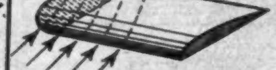


FIG. 7

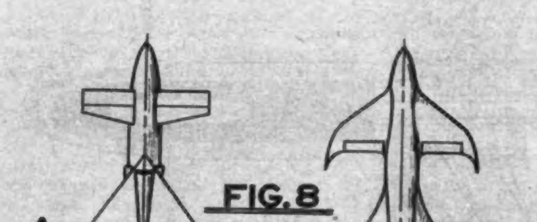


FIG. 8

DESIGN FORUM

by CHARLES H. GRANT

CONTROL LINE fliers are still battering away at the high speed records. The records of 125 to 130 mph are apparently becoming a little musty with age. They are not satisfying the urge to travel faster and faster. In their search for speed, many control liners are fixing their attention on the aero-dynamic design of their plane, i. e. upon its proportions and shape. This, indeed, is one of the great factors that affect speed and is the chief concern of full-scale aircraft designers. If the plane can be so proportioned and shaped that the drag is low, speed is increased.

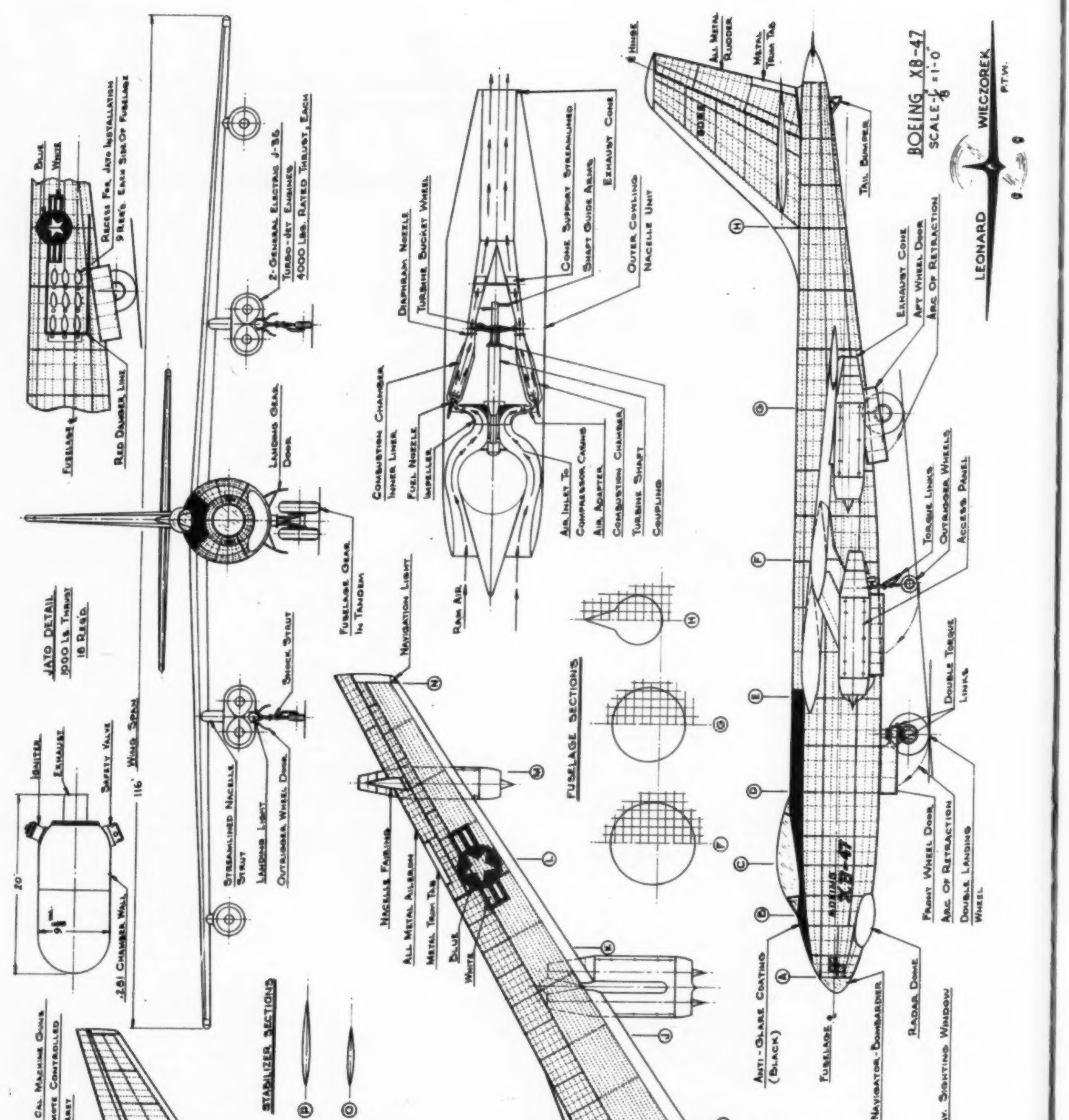
However, there are other factors of even greater importance in control line flying. One of them is power generated by the engine; and another is power transmitted by the propeller. The latter should be the chief concern of all control line speed fliers because, regardless of how much power your engine generates, it is the thrust delivered by the propeller, times the revolutions per minute, times the pitch that gives results. In other words, for any given number of revolutions and pitch (which means for any given pitch speed), the propeller thrust will be the greatest and most important factor in generating speed, even more important than drag when it comes to the design of *present day* control line speed jobs. We do not mean the drag is unimportant, but that in present designs any change in design will result in only a small change in drag. This, of course, refers to the highly streamlined planes flown at contests by the experts.

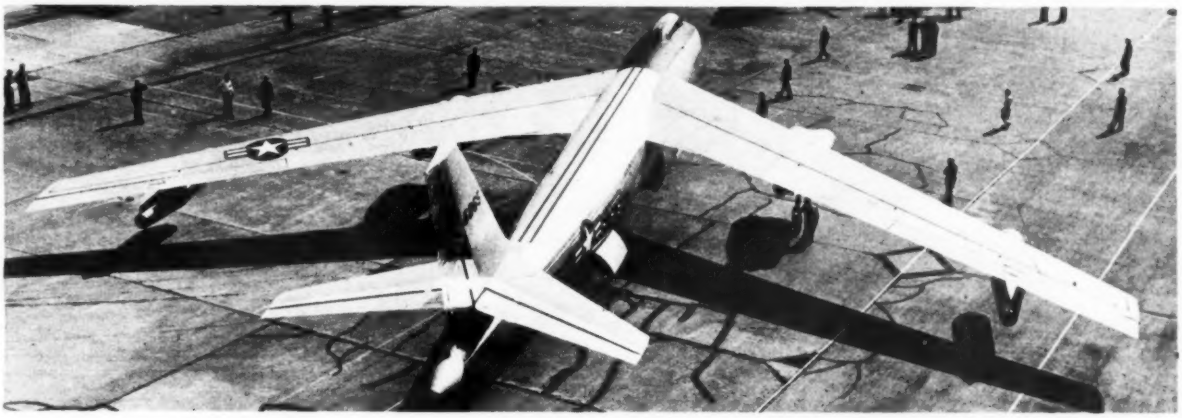
The wing planform and size of the wing has less to do with breaking records than most modellers believe. All that is needed is sufficient surface to lift the model from the ground. Greater surface only creates unnecessary resistance, and apparently very much less surface is required than is used on many contest winners. We have even seen models fly with one wing. Apparently clipping off one wing has no effect on stability because the single wing is attached and held rigid to the control wires, which makes it impossible for the plane to deviate from its normal course.

This leads us to believe that possibly a plane could fly with only two small fins protruding from the fuselage, because it has been observed that some of the lift is generated by the upward component pull of the control wires when the plane is travelling at high speed. Fig. 1 illustrates this condition. The control handle is held two or three feet above the plane resting on the ground. As the plane gains speed along its circular path, the outward pull or centrifical force CF will generate an upward component CU. This helps lift the plane from the ground. As the plane rises and approaches the level of the control handle, this upward component diminishes. It may be observed, therefore, that if the plane's speed is great enough, this upward component CU will equal the weight of the airplane and the plane will lift from the ground without the aid of wings. Of course, wings are necessary if the plane is to rise higher than the level of the control handle. Apparently many modellers realize this and have cut their wings and tail surfaces down to a minimum of area. The wing leading edges have been sharpened and their thickness reduced in order that they may cleave the air with little drag.

Recently, great consideration has been given to motor cowling because the drag due to the protruding motor is often greater than the drag created by the rest of the airplane itself. In fact, in the light of present knowledge, little can be done to reduce

(*Turn to page* 44)


BOEING XB-47
SCALE-1/8"=1'-0"
LEONARD WIECZOREK
P.T.W.
HINGE
ALL METAL RUDDER
METAL TRIM TAB
TAIL BUMPER
EXHAUST CONE
AFT WHEEL DOOR
ARC OF RETRACTION
TORQUE LINKS
OUTRIGGER WHEELS
ACCESS PANEL
DOUBLE TORQUE LINKS
FRONT WHEEL DOOR
ARC OF RETRACTION
DOUBLE LANDING WHEEL
RADAR DOME
NAVIGATOR-BOMBARDIER
NAV. SIGHTING WINDOW
ANTI-GLARE COATING (BLACK)
FUSELAGE ℄
XB-47
FUSELAGE SECTIONS
WING SECTIONS
36° SWEEPBACK
STABILIZER SECTIONS
.50 CAL. MACHINE GUNS
REMOTE CONTROLLED TURRET
20
9 1/2" DIA.
.281 CHAMBER WALL
IGNITER
EXHAUST
SAFETY VALVE
116' WING SPAN
JATO DETAIL
1000 LB. THRUST
18 REQ'D
STREAMLINED NACELLE STRUT
LANDING LIGHT
OUTRIGGER WHEEL DOOR
SHOCK STRUT
FUSELAGE GEAR IN TANDEM
NAVIGATION LIGHT
NACELLE FAIRING
ALL METAL AILERON
METAL TRIM TAB
BLUE
WHITE
RAM AIR
COMBUSTION CHAMBER
INNER LINER
FUEL NOZZLE
IMPELLER
AIR INLET TO COMPRESSOR CASING
AIR ADAPTER
COMBUSTION CHAMBER
TURBINE SHAFT
COUPLING
DIAPHRAM NOZZLE
TURBINE BUCKET WHEEL
CONE SUPPORT STREAMLINED
SHAFT GUIDE ARMS
EXHAUST CONE
OUTER COWLING
NACELLE UNIT
LANDING GEAR DOOR
FUSELAGE ℄
RED DANGER LINE
RECESS FOR JATO INSTALLATION
9 REQ'D. EACH SIDE OF FUSELAGE
BLUE
WHITE
2-GENERAL ELECTRIC J-35
TURBO-JET ENGINES
4000 LBS. RATED THRUST, EACH



PLANE ON THE COVER

BOEING XB-47

by ROBERT McLARREN

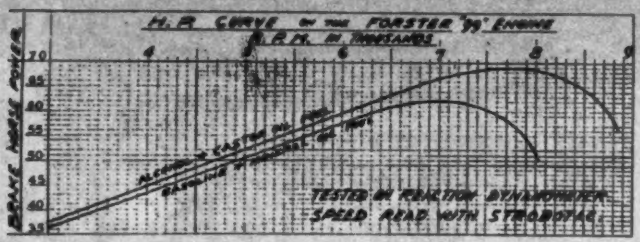
AN entirely new era in Air Power is harbingered by the creation of the Boeing XB-47, the most radical new bomber design ever to wear the red-white-and-blue of the U.S. Air Force, or any air force for that matter. From its sleek nose to its sharp, sweptback tail, it is *new* in every detail. And airborne in battle, it will be *new* in hitting power, in tactical employment and in making possible entirely *new* strategic concepts of Air Power. Assuredly, the Boeing XB-47 ushers in as radical a new element in Air Power as did the Boeing 299, prototype of the war-winning B-17 *Flying Fortress*.

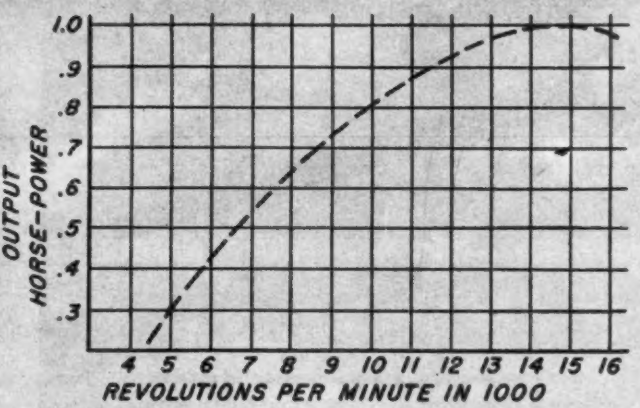
The XB-47 is a member of a class, but like all classes it produced one brilliant leader against which all the other class-members could not be compared. For the XB-47 began as simply a number in a series: XB-45, XB-46, XB-47, XB-48 and YB-49, a new series of experimental jet bombers launched by Air Materiel Command of the (old) Army Air Forces many months before the end of the war. AAF's High Speed Bomber Program was a series of jet bombers each designed to explore the possibilities of a series of jet bomber configurations: four jet, six jet and eight jet. The manufacturers were chosen by AAF on the basis of their war record and their availability and design-ability in the past. North American (famed B-25 *Mitchell*), Consolidated-Vultee (mighty B-24 *Liberator*), Boeing (B-17 *Flying Fortress*), Glenn L. Martin (sleek B-26 *Marauder*) and Northrop Aircraft Inc. (producers of the XB-35 *Flying Wing*). The XB-45 and XB-46 were to be four jet, the XB-47 and XB-48 six jet, and the YB-49 eight jet; a complete program of multi-jet bombers.

First step was the formation of a committee and the creation of a joint AAF-NACA research program. These bombers were going to be needed fast (for the war), they were going to fly fast and they were all going to meet the same compressibility problems. NACA proposed a joint program, for its already over-strained facilities could not accommodate individual hi-speed wind tunnel tests of each airplane model, as was originally planned. Why not a single research program to determine the best possible basic configuration, with each manufacturer using as much of the data produced by this program as he saw fit, thereby preserving the competitive requirements of the industry? The O.K. was given and NACA's Russell G. Robinson was placed in charge of the program, which was centered at NACA Ames Aeronautical Laboratory at Moffett Field, convenient to the majority of the companies selected.

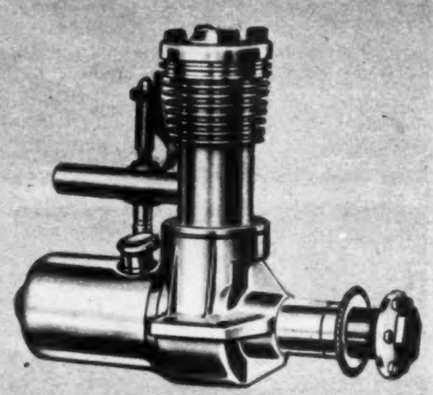
(*Turn to page 60*)

MODEL MOTORS

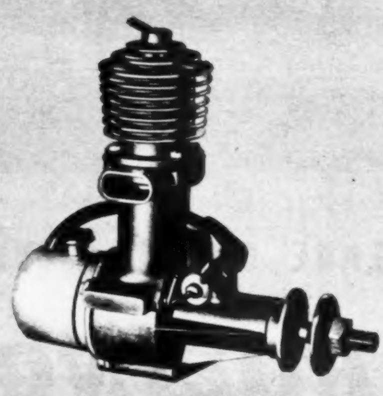




HORSEPOWER CURVE OF FOX "59" ENGINE



AIR-O DIESEL



DELONG DIESEL

FOR 1948

by EDWARD G. INGRAM

BECAUSE the field of model engine manufacture is one of constant change, the task of keeping the model airplane builder informed about designs of current engines is a difficult one. New makes and improved models constantly are appearing on the market; and there is also a certain mortality, that is, engines whose production is discontinued.

After the publication of extensive tables on construction, dimensions and performance of model engines in December 1946 M.A.N., an attempt was made to keep the reader informed on current developments through supplementary articles. Since the last article appeared, more engines have been introduced and there have been changes in the specifications of others. The accompanying revised and enlarged tables have been compiled with the object of providing model builders with collective up-to-date information about features of present day model engines.

As in the past tables presented, and unlike tables compiled by others, the coverage includes not only important dimensions of each engine, but also certain comparative figures which had to be calculated, and particulars about the materials used in various component parts. The work has been carried out with the aim of providing more detailed information about model engines than has heretofore been available.

With regard to the calculated comparative data, the reader is again warned not to jump to rash conclusions about the relative worth of engines from the figures given, because so many considerations are involved in the choice of an engine for a particular service. Also, it must be pointed out that the brake horsepower figures supplied by the makers for some engines are so high as to cast doubt on the accuracy of the tests.

Listed in the accompanying tables are specifications of 61 spark-ignition engines, 5 compression-ignition engines, and one hot coil ignition engine, all of the two-cycle type; and also one four-cycle engine, two carbon dioxide engines, and two pulse-jet engines, a total of 72 engines.

Because the Class C *McCoy* has an established reputation—particularly in the racing field where it has shown outstanding performance—much interest is attached to the recent announcement of a Class B *McCoy*, which closely followed the announcement of the *McCoy 49*, a smaller Class C model. Of particular interest is the fact that this new *McCoy* is the first Class B engine provided with piston rings, and a crankshaft supported on two ball bearings. In most respects the construction closely parallels that of the larger *McCoy* models, the cylinder and crankcase being an integral aluminum alloy sand casting with a Meehanite cylinder liner. The engine may be operated on a fuel mixture of 3 parts gasoline

(*Turn to page* 18)

TABLE 1. MODEL ENGINE CONSTRUCTION DATA

SPARK-IGNITION ENGINES

	Class	Displacement, Cu. In.	Cylinder	Cylinder Attachment to Crankcase	Cylinder Head	Cylinder Head Attachment to Cylinder	Crankcase	Piston	Connecting Rod	Crankpin Bearing	Wristpin Bearing	Crankshaft Bearing	Number of Cyl. Ports	Crankcase Admission Valve
Elf Single	A	.097	Alum. Alloy Steel Liner	4 Screws (No Gasket)	Alum. Alloy	4 Screws (No Gasket)	Alum. Alloy	Alum. Two-piece design	Alum. Alloy, Rolled Stock	No Bushing, Bronze Strap	No Bushing	No Bushing (2-Bearings)	3	
Super Atom	A	.098	Steel, Cr. Moly.	Threaded	Alum. Alloy	Threaded	Iron, Mn.	Steel, Cr. Moly.	Steel, Hardened	No Bushing	Steel, Ball and Socket	Tool Steel Bushing	2	Rotary, Shaft Type (Piston Inlet Valve)
Arden	A	.099	Steel, Alloy	Threaded	Alum. Alloy	Threaded	Alum. Alloy, Die Cast	Steel, 1440 Cr. Moly	Steel, Cr. Moly	No Bushing	Steel, Ball and Socket	Bronze and 2 Ball	2	Rotarx, Shaft Type
Marvin	A	.140	Cyl. Iron, Sand Cast	Screws	Cyl. Iron, Sand Cast	Threaded	Special Alloy, Die Cast	Cyl. Iron, Sand Cast	Special Alloy, Perm. Mold	No Bushing	No Bushing	Oilite Bushing	4	
Elf Twin	A	.195	Alum. Alloy Liner	Screws (No Gasket)	Alum. Alloy	4 Screws (No Gasket)	Alum. Alloy	Alum., Two-piece design	Alum. Alloy Rolled Stock	No Bushing Bronze Strap	No Bushing	No Bushing, Ball Thrust, (2 Bear.)	3	
Ohlsson "19"	A	.197	Steel	Spot Weld	Steel	Integral	Alum. Alloy Die Cast	Steel	Alum. Alloy Die Cast	Bronze Bushing	No Bushing	Br. Bushing Ball Thrust	3	
Arden "199,"	A	.198	Steel, Alloy	Threaded	Alum. Alloy, Turned	Threaded	Alum. Alloy, Die Cast	Steel, Cr. Moly	Steel, Cr. Moly	No Bushing	Ball and Socket	Bronze and 2 Ball	2	Rotary, Shaft Type
Bantam	A	.199	Steel, Mang. Moly.	2 Screws	Steel	Integral	Magnesium, Die Cast	Meehanite Iron	Magnesium, Die Cast	Meehanite Bushing	No Bushing	Bronze Bushing	2	Rotary, Disk Type
Cameron "23"	B	.230	Iron, Gray	4 Screws	Alum. Alloy, 17S-T	6 Screws	Zamak Alloy	Iron, Gray	Zamak Alloy	No Bushing	No Bushing	Alum. Alloy, 17S-T	3	
Ohlsson "23"	B	.232	Steel	Spot Weld	Steel	Integral	Alum. Alloy, Die Cast	Steel	Alum. Alloy Die Cast	Bronze Bushing	No Bushing	Br. Bushing Ball Thrust	3	
Merlin	B	.232	Alum. Alloy, Steel Liner	Integral	Alum. Alloy	Threaded	Alum. Alloy	Steel, Alloy	Alum. Alloy, Die Cast	Bronze Bushing	No Bushing	Bronze Bushing	3	
K & B "24"	B	.249	Steel	4 Screws	Alum. Alloy, Die Cast	4 Screws	Alum. Alloy, Die Cast	Meehanite	Alum. Alloy, Die Cast	Bronze Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type
Bullet	B	.276	Steel	Screws	Alum. Alloy, Die Cast	Screws	Alum. Alloy, Die Cast	Meehanite Iron	Alum. Alloy, Die Cast	Bronze Bushing	No Bushing, Bronze Pin	Bronze Bushing	2	Rotary, Shaft Type
Everson 29	B	.290	Al. Alloy, 17S-T Perm. Mold	Integral		Threaded	Al. Alloy, 17S-T, Perm. Mold	Steel	Bronze	No Bushing	No Bushing	Bronze Bushing		Rotary, Shaft Type
Judco Ram	B	.292	Alum. Alloy	Screws	Alum. Alloy	Integral	Alum. Alloy	Alum. Alloy, Hardened	Alum. Alloy	No Bushing	No Bushing	No Bushing	3	
Genie "29"	B	.292	Die Cast	2 Screws		Integral	Die Cast	Die Cast	Dural	No Bushing	No Bushing	No Bushing	3	
Thor	B	.292	Alum. Alloy	Bolts	Alum. Alloy	Integral	Alum. Alloy	Alum. Alloy	Alum. Alloy	No Bushing	No Bushing		3	
McCoy "29"	B	.296	Alum. Alloy, Sand Cast, Meehanite Liner	Integral	Alum. Alloy, 195-T6	6 Screws	Alum. Alloy, 195-T6	Alum. Alloy, 2 Rings	Alum. Alloy, 17S-T, Forged	No Bushing	No Bushing	2 Ball	2	Rotary, Disk Type
Forster "29"	B	.297	Steel, Alloy	4 Screws	Alum. Alloy, Die Cast	6 Screws	Alum. Alloy, Die Cast	Steel, Alloy, Hardened	Alum. Alloy	Oilite Bronze Bushing	No Bushing	Ball	2	Rotary, Disk Type
Pierce	B	.297	Steel	Screws	Alum. Alloy		Alum. Alloy, Die Cast	Steel	Alum. Alloy, Die Cast	Bronze Bushing				Rotary, Disk Type
Torpedo Special	B	.298	Steel, Alloy	Screws	Alum. Alloy, Die Cast	Screws	Alum. Alloy, Die Cast	Meehanite Iron	Alum. Alloy, Die Cast	Bronze Bushing	No Bushing Bronze Pin	Bronze Bushing	2	Rotary, Shaft Type
Phantom "P30"	B	.298	Steel, Alloy	6 Screws		6 Screws	Alum. Alloy, Die Cast	Cast Iron	Alum. Alloy, Die Cast	Bronze Bushing	No Bushing	Bronze Bushing	3	Rotary, Shaft Type, Square
Cannon "300"	B	.299	Alum. Alloy, Iron Liner	Integral	Alum. Alloy	Screwed on	Alum. Alloy, Die Cast	Steel	Bronze, Manganese	No Bushing	No Bushing	Bronze Bushing		Rotary, Shaft Type
K & B Torpedo	B	.299	Steel	4 Screws	Alum. Alloy, Die Cast	4 Screws	Alum. Alloy, Die Cast	Meehanite Iron	Alum. Alloy, Die Cast	Bronze Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type
O.K. "29"	B	.299	Steel	Screws	Steel	Integral	Alum. Alloy	Steel	Alum. Alloy, Forged	No Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type
Mohawk Chief	B	.299	Steel				Alum. Alloy	Steel, Hardened	Alum. Alloy					Rotary
De Long "30"	B	.300	Alum. Alloy, Mee. Liner	Cap Screws	Alum. Alloy, Die Cast	Screwed	Alum. Alloy	Steel, Alloy, Hardened	Dural	Bronze Bushing	No Bushing	Bronze Bushing	2	Rotary, in rear
Vivell "35"	C	.351	Steel, Bar Stock	2 Screws	Alum. Alloy	4 Screws	Alum. Alloy, Sand Cast	Iron, Cast	Alum. Alloy	Bronze Bushing	Bronze Bushing	Bronze Bushing	2	Rotary Shaft Type
Cannon "358"	C	.359	Alum. Alloy, Iron Liner	Integral	Alum. Alloy	Screwed on	Alum. Alloy, Die Cast	Steel	Bronze Manganese	No Bushing	No Bushing	Bronze Bushing		Rotary, Shaft Type
Elf Four	C	.389	Alum. Alloy, Carbon Steel Liner	Screws (No Gasket)	Alum. Alloy	4 Screws (No Gasket)	Alum. Alloy	Alum. Two-Piece Design	Alum. Alloy, Rolled Stock	No Bushing Bronze Strap	No Bushing	No Bushing Ball Thrust (2 Bear.)	3	
Air-O Mighty Midget	C	.451	Steel	Threaded	Alum. Alloy	6 Bolts	Alum. Alloy, Die Cast	Steel, 2 Rings	Steel	Cr. Moly	Cr. Moly	Bronze Bushing	4	
Rocket	C	.454	Alum. Alloy	6 Bolts	Alum. Alloy	Integral	Alum. Alloy	Steel, Hardened	Steel, Stamping	No Bushing	No Bushing	Steel Bushing	2	Rotary, Rear Shaft
Madewell "49"	C	.488	Steel, Alloy	Screws	Alum. Alloy, 17S-T	Screws	Alum. Alloy, Perm. Mold	Iron, Cast, Meehanite	Alum. Alloy, Die Cast	Bronze Bushing	Bronze Bushing	Bronze Bushing	3	Rotary, Shaft Type
Vivell "Forty-Niner"	C	.489	Steel, Bar Stock	2 Screws	Steel	Integral	Alum. Alloy, Die Cast	Iron, Cast	Steel, Tool	No Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type
McCoy Red Head, Jr.	C	.491	Alum. Alloy, 195-T6, Meehanite Liner	Integral	Alum. Alloy, 195-T6	6 Screws	Alum. Alloy 195-T6	Alum. Alloy 142, 2 Rings	Alum. Alloy 24 S-T	No Bushing	No Bushing	Ball	2	Rotary, Disk Type
G. H. Q.	C	.518	Gray Iron	Bolts	Alum. Alloy Die Cast	Screws	Alum. Alloy Die Cast	Steel	Bronze	No Bushing	No Bushing	Bronze Bushing	4	
Vivell "Twin"	C	.569	Steel, Bar Stock	4 Screws	Steel	Integral	Alum. Alloy, Sand Cast	Iron Cast	Alum. Alloy	No Bushing	No Bushing	Br. Bushing 2 Bearings	2	Rotary, Shaft Type
Dennymite	C	.573	Iron Alloy	2 Screws	Iron Alloy	Integral	Alum. Alloy	Iron, Cast	Alum. Alloy	No Bushing	No Bushing	Bronze	4	
Fox	C	.593	Steel, Alloy	Screws	Alum. Alloy	Screws	Alum. Alloy	Meehanite	Alum. Alloy, Forged	Alum. Bronze Bushing	No Bushing	2 Ball	2	Rotary, Disk Type
Contestor, D	C	.596	Steel, Carbon	Silver Brazed	Alum. Alloy	6 Screws	Alum. Alloy	2 Rings	Steel, Cr. Moly Forged				2	Rotary, Disk Type
Junior Motors "60"	C	.604	Steel	3 Bolts	Alum. Alloy	5 Bolts	Alum. Alloy, Die Cast	Alum. Alloy, 2 Rings	Alum. Alloy, Forged	Iron Sintered	No Bushing	Bronze Bushing	3	Rotary, Disk Type
Wasp-Twin	C	.604	Steel, Turned	Permanently attached	Alum. Alloy, Intracast	Screws	Alum. Alloy, Intracast	Steel, Hardened	Alum. Alloy, Intracast	No Bushing	No Bushing	2 Br. Bush. Ball Thrust	2	Rotary, Shaft Type (rear)
Scout Twin	C	.604	Alum. Alloy, Steel Liner	Integral	Alum. Alloy	Screws	Alum. Alloy, Centrif. Cast	Steel	Alum. Alloy, Centrif. Cast	No Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type (rear)
Ball BC	C	.604	Alum. Alloy, Meehanite Liner	Studs and Nuts	Alum. Alloy Perm. Mold	Screws	Alum. Alloy Perm. Mold	Alum. Alloy, 2 Rings	Alum. Alloy, 24S-T	No Bushing	No Bushing	2 Ball		Rotary, Shaft Type
Anderson Spitfire	C	.604	Alum. Alloy, Die Cast, Iron Liner	4 Bolts	Alum. Alloy, Die Cast	8 Screws	Alum. Alloy, Die Cast	Iron Alloy	Alum. Alloy, Forged	Bronze Bushing	No Bushing	Ball Bearing	2	Rotary, Shaft Type
Fleetwind	C	.604	Steel, Hardened	4 Bayonet Locks	Steel	Integral	Alum. Alloy, Die Cast	Meehanite	Alum. Alloy Forging	Bronze Bushing	Bronze Bushing	Bronze Bushing	2	Rotary, Disk Type
Hornet "60-A"	C	.604	Alum. Alloy, Sand Cast, Meehanite Liner	4 Screws	Alum. Alloy	6 Screws	Alum. Alloy, Sand Cast	Alum. Alloy, 2 Rings	Dural, 14S Forging	Bronze Bushing	No Bushing	2 Ball	2	Rotary, Disk Type
Ken "610"	C	.604	Alum. Alloy, Centrif. Cast Iron Liner	Integral	Alum. Alloy	6 Screws	Alum. Alloy	Cast Iron	Alum. Alloy	Bronze Bushing	Bronze Bushing	2 Ball	3	Rotary, Induction Blower
Ohlsson "60"	C	.604	Steel	Spot Weld	Steel	Integral	Alum. Alloy, Die Cast	Cast Iron	Alum. Alloy, Die Cast	Bronze Bushing	Bronze Bushing	Br. Bushing Ball Thrust	3	
O. K. Super "60"	C	.604	Steel	Screws	Steel	Integral	Alum. Alloy	Steel	Alum. Alloy, Forged	No Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type

(*Continued on page 18*)

	Class	Displace-ment, Cu. In	Cylinder	Cylinder Attach-ment to Crankcase	Cylinder Head	Cylinder Head Attachment to Cylinder	Crank-case	Piston	Connecting Rod	Crankpin Bearing	Wristpin Bearing	Crankshaft Bearing	Number of Cyl. Ports	Crankcase Admission Valve
Super Cyclone	C	.604	Alum. Alloy, Die Cast, Iron Liner	4 Bolts	Alum. Alloy, Die Cast	6 Screws	Alum. Alloy, Die Cast	Iron Cast	Alum. Alloy	Bronze Bushing	No Bushing	Bronze Bushing, Ball Thrust	2	Rotary, Shaft Type
Dooling "61"	C	.607	Alum. Alloy, Perm. Mold Iron Liner	Integral	Alum. Alloy	8 Bolts	Alum. Alloy	Alum. Alloy, Perm. Mold 2 Rings	Alum. Alloy, Perm. Mold, Forged	Roller	No Bushing	2 Ball		Rotary, Disk Type
McCoy	C	.607	Alum. 195-T6 Sand Cast, Mee. Liner	Integral	Alum. Alloy, 142	6 Screws	Alum. Alloy, Sand Cast	Alum. Alloy, 142, 2 Rings	Alum. 148T Forged	Alum.-Bronze Bushing	Alum.-Bronze Bushing	2 Ball	2	Rotary, Disk Type
Super Champion, JII	C	.624	Steel	3 Through-bolts	Alum. Alloy, Die Cast	6 Bolts	Alum. Alloy, Die Cast	Alum. Alloy, 2 Rings	Dural, Forged	Bronze Bushing	No Bushing	Oilite Br. Bushing, Ball Thrust	2	Rotary, Shaft and extra rear
Thunderbird	C	.645	Steel	Screws	Steel	Integral	Alum. Alloy, Die Cast	Alum. Alloy, Die Cast, 2 Rings	Alum. Alloy, Die Cast	Bronze Bushing	Bronze Bushing	2 Ball	2	Rotary, Rear Shaft-Type, Impeller
Orr "65"	C	.647	Alum. Alloy, Sand Cast, Steel Liner	Bolts	Alum. Alloy, Sand Cast	Screws	Alum. Alloy, Sand Cast	Alum. Alloy, Sand Cast, 2 Rings	Alum. Alloy, 178-T, Forged	Oilite Bronze Bushing	No Bushing	2 Ball	2	Rotaty, Disk-Type, Ball Bearing
Viking "65"	C	.648	Alum. Alloy, Die Cast, Steel Liner		Die Cast			Steel				2-Bearing		
Molnar	C	.785	Steel, Chrom.-Moly	Threaded	Steel, Chrom-.Moly	Bolts	Alum. Alloy, Sand Cast	Steel, Chrom-Moly, 2 Rings	Steel, Tool	Bronze Bushing	No Bushing	Oilite Br. Bushing		Rotary, Shaft-Type
Forster Super "99"	C	.907	Alum. Alloy, Die Cast, Steel Liner	4 Screws	Alum. Alloy, Die Cast	Integral	Alum. Alloy, Die Cast	Alum. Alloy, Lo-ex. 2 Rings	Alum. Alloy	Bronze Bushing	Bronze Bushing	Ball	3	
O. K. "Twin"	C	1.208	Steel	Screws	Steel	Integral	Alum. Alloy	Steel	Alum. Alloy, Forged	No Bushing	No Bushing	Bronze Bushing	3	
Avion Mercury "45"	C	1.609	Magnesium, Sd. Cast Carbon Steel Liner	Screws	Magnesium Sand Cast	Integral	Magnesium, Dow H HT, Sand Cast	Alloy, 2 Rings	Magnesium, Dow H HT, Sand Cast	Bronze Bushing	Bronze Bushing	2 Ball	3	
CARBON DIOXIDE ENGINES														
Campus "A-100"		.0015	Steel	Threaded	Steel	Threaded	Alum.	Steel	Bronze	No Bushing	No Bushing	NoBushing		Ball
O K "CO2"		.0178	Steel	Threaded	Steel	Threaded	Alum.	Steel	Bronze	No Bushing	No Bushing	NoBushing		Ball
COMPRESSION-IGNITION ENGINES														
C. I. E.	A	.147	Alum. Alloy, Meehanite Liner	4 Bolts	Steel, Cr. Moly		Alum. Alloy 356, Perm. Mold	Steel, Cr. Moly	Steel, Tubular	Tin Base	No Bushing, Bronze Pin	Oilite Bushing	4	
Air-O-Diesel	B	.278	Steel, Bar Stock	Threaded	Alum. Alloy, 248-T	5 Screws	Alum. Alloy, Die Cast	Steel, Alloy	Steel, Cr. Moly	No Bushing	No Bushing	Bronze Bushing	3	
DeLong Diesel	B	.295	Steel	4 Screws		Threaded	Die Cast	Steel	Alum. Alloy	Bronze Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type
Speed Demon	B	.296	Outer Alum. Inner Steel	Outer Screws, Inner Movable	Outer Alum. Inner Steel	Outer Integral, Inner Pressed on	Alum. Alloy, Bar Stock	Iron, Cast	Steel Cold Rolled	Oilite Bronze Bushing	Oilite Bronze Bushing	Oilite Bronze Bushing		
Drone Gold Crown	B	.296	Alum. Alloy, Sand Cast, Steel Liner	4 Screws	Alum. Alloy	4 Screws	Alum. Alloy, Sand Cast	Iron Alloy	Alum. Alloy	Bronze Bushing	No Bushing	Bronze Bushing	2	Rotary, Shaft Type
HOT COIL IGNITION ENGINES														
H & H	C	.451	Iron, Cast	Threaded	Alum. Alloy	Screws	Alum. Alloy	Steel	Steel and Bronze			Bronze Bushing		
FOUR-CYCLE ENGINES (SPARK-IGNITION)														
Burgess M-5, Radial	C	.942	Alum. Alloy, Die Cast, Steel Liner	Screws	Alum. Alloy	Integral	Alum. Alloy, Die Cast	Alum. Alloy, Cast	Alum. Alloy, Die Cast	No Bushing	Master, Oilite Bushing	2 Ball		(Poppet Valves, Dia. ¼" Lift 3/32.")

NOTES

A Molnar engine with a ⅛ in. larger bore and displacement of .994 cu. in. also is produced. High compression cylinder heads are supplied as extra equipment for the following engines: Super Champion, comp. ratio 8.00 to 1; K & B Torpedo "29", ratio 8.20 to 1; K & B "24", ratio 8.50 to 1. Rotary valves are supplied as extra equipment for the Ohlsson "19", "23", and "60" engines. A Pierce "29" engine without a rotary valve (3-port), designated as Model J, now is produced. It is understood the comp. ratio and power of the O. K. "29" have been increased recently. A variable compression head may be had for the Drone diesel.

and 1 part cylinder oil, or on 2-1/2 parts methanol and 1 part castor oil.

A new make of Class C engine that bids fair to be an important competitor in the field of high efficiency engines is the *Fox*, manufactured by Claude C. Slate Co. Rated at .80 hp at 10,000 rpm, the manufacturer presents a curve indicating that the engine develops 1.00 hp at about 15,000 rpm.

In response to a request for more details about the method of testing this engine, Mr. Slate states that the test was made with an engine that was completely run in by operation for 24 hours at 10,000 rpm. The equipment used was a conventional torque stand with adjustable weights, which gave the inch-ounces of torque. This figure was, of course, multiplied by the rpm to get the horsepower. Commercially available propellers rather than a flywheel were used to obtain some cooling effect for the engine. The fuel mixture used was 2 parts clear gasoline to 1 part No. 70 oil, although it was found the rpm could be increased from 1% to 2% by using better grades of prepared fuels. Mr. Slate also states the engine has gone through four years of research and testing. Sample engines were flight tested by a selected group of model enthusiasts. Eighteen months of continuous flying and other tests were carried out before the engine was placed on the market. Because of the relatively low compression ratio of 6 to 1, a very hot spark is not required for efficient operation, although it is desirable to use a good make of coil as well as condenser.

The cylinder head, crankcase, crankcase cover, rotor disks, and timer bracket are die cast from silicon aluminum alloy. The steel cylinder is broached, polish-honed, and lapped to the Meehanite piston. A large bronze bearing is fitted to the lower end of the connecting rod. Two ball bearings having diameters of 3/8 in. and 1/2 in. support the crankshaft. The crankshaft throw is forged from nickel-chromium steel and furnace brazed to the chrome-molybdenum shank. An unusually long crankshaft is used to eliminate the need for an extension shaft for the cowling on high speed planes and scale models. The bare engine weight is stated to be 9 oz., which is low for an engine of about .60 cu. in. displacement. Fuel mixture is admitted to the crankcase by a disk-type rotary valve.

The piston displacement of the latest *Super Cyclone* has been reduced from .647 cu. in. to .604 cu. in. Most of the design features are similar to the well known earlier model. The piston now is made from iron by centrifugal casting, and the weight of the engine now is 9-1/2 oz. For U-control a 12" diameter, 10" pitch propeller is used; while for free flight a prop of 13" to 14" diameter and 6" to 8" pitch is advised.

Designed by Dan Bunch, one of the real pioneers in the development of model engines, the *Contestor* is a Class C engine rated at 1/2 hp and weighing 11 oz. The cylinder head is cast from aluminum alloy and the carbon steel cylinder is broached and honed to finish and silver brazed to the crankcase. Two rings are fitted to the piston. The connecting rod is forged from chrome molly steel and the one-piece crankshaft is machined from hardened steel. The cylinder has .945 in. bore and a stroke of .850 in., which makes the displacement .596 cu. in. A disk rotary valve is used. The engine may be operated on ethyl gasoline or on methanol-castor mixture for high speed work.

Produced by the manufacturer of the Dooling model race car, the *Dooling 61* racing engine is said to be the result of a research investigation during which 33 different engines were built and 9 remodeled. Some of these were odd types; four were four-stroke-cycle, one was a twin, and three were equipped with efficient superchargers. All tests were carried out with an electric dynamometer built in the company's shop.

A distinctive feature of the *Dooling 61* is the provision of a roller bearing for the crankpin. The rollers turn in a hardened and ground race in the lower end of the

(*Turn to page* 50)

TABLE 2. MODEL ENGINE DIMENSIONS AND PERFORMANCE DATA

SPARK-IGNITION ENGINES

	Class	Displacement Cu. In.	Bare Engine Weight, Ozs.	Weight per Cu. In. Disp., Lbs.	No. of Cylinders	Cylinder Bore and Stroke	Stroke-Bore Ratio (to 1)	Cylinder Compression Ratio (to 1)	Rated Horsepower	Revolutions per Minute at Rated Horsepower	Maximum Brake Horsepower	Revolutions per Minute at Max. Brake H.P.	Max. Brake H.P. per Cu. In. Disp.	Engine Weight per Brake H.P., Lbs.	Recommended Propeller Dia., In.	Recommended Propeller Pitch, In.	Revolutions per Minute with Recommended Prop.	Type of Mount
Elf Single	A	.007	3.00	1.93	1	.468 x .564	1.21	7.00	1/12	8,000	...	......	......	......	9-8	6-5	8,000	Beam
Super Atom	A	.098	2.00	1.27	1	.500 x .500	1.00	5.00	1/10	.....	...	......	......	......	10-9	6-7	.....	Beam
Arden	A	.099	2.62	1.63	1	.495 x .516	1.04	9.00	1/10	10,000	...	......	......	......	8	4	10,000	Radial
Marvin Junior	A	.140	5.00	2.23	1	.562 x .562	1.00	7.00	1/10	7,500	...	......	......	......	9 8	3 6	7,500 8,500	Beam-Radial
Elf Twin	A	.195	5.00	1.60	2	.468 x .564	1.21	7.00	1/6	7,500	...	......	......	......	9.6	6	8,100	Radial
Ohlsson "19"	A	.197	4.00	1.27	1	.687 x .531	.77	....	1/7	7,000	...	......	......	......	10-9	5	.....	Bm.-Rd.
Arden "199"	A	.198	4.16	1.31	1	.635 x .625	98	9.00	1/5	10,000	...	......	......	......	7	8	.....	Radial
Bantam	A	.199	3.25	1.02	1	.656 x .590	.90	8.00	1/7	7,350	...	......	......	......	10 9	High 6	7,050 11,300	Beam
Cameron "23"	B	.230	5.75	1.56	1	.625 x .750	1.20	7.00	1/5	9,300	...	......	......	......	10	5	9,000	Bm.-Rd.
Ohlsson "23"	B	.232	4.50	1.21	1	.687 x .625	.91	6.00	1/6	7,500	...	......	......	......	10	6	.....	Bm.-Rd.
Merlin	B	.232	5.50	1.48	1	.687 x .625	.91	6.00	1/6	7,000	...	......	......	......	10	8	7,000	Beam
K & B "24"	B	.249	7.00	1.76	1	.662 x .724	1.09	7.00	1/5	......	...	......	......	......	10	...	8,750	Bm.-Rd.
Bullet	B	.276	6.50	1.47	1	.750 x .625	.83	9.00	...	......	...	......	......	......	11 9	6 8	8,400 8,500	Beam
Everson 29	B	.290	7.75	1.76	1	.687 x .781	1.14	8.00	1/6	8,000	...	......	......	......	11	8	7,560	Beam
Judco Ram	B	.292	4.50	.96	1	.812 x .562	.69	3.50	1/6	6,800	...	......	......	......	11	Low	.....	Beam
Genie "29"	B	.292	4.00	.86	1	.812 x .562	.69	....	1/6	10,800	...	......	......	......	10	6	.....	Beam
Thor	B	.292	4.50	.96	1	.812 x .562	.69	9.00	1/6	8,000	...	......	......	......	10-11-12	6-8	8,000	Beam
McCoy "29"	B	.296	7.00	1.48	1	.650 x .670	.89	7.00	1/2	14,000	...	......	......	......	9	8	13,000	Beam
Forster "29"	B	.297	6.50	1.37	1	.750 x .672	.90	9.00	....	Alcohol Gasoline	.383 .321	13,100 11,400	1.286 1.081	1.06 1.27	11 9	6 8	7,200 up	Beam-Radial
Pierce	B	.297	....	......	1	....	....	....	1/5	......	...	......	......	......	..	.	.....	Beam
Torpedo Special	B	.298	7.75	1.63	1	.711 x .750	1.05	11.00	...	......	...	......	......	......	12 9	6 8	8,200 9,500	Beam-Radial
Phantom "P-30"	B	.298	7.75	1.63	1	.711 x .750	1.05	5.75	1/5	8,500	...	......	......	......	11	8	8,200	Beam
Cannon "300"	B	.299	6.50	1.36	1	.750 x .678	.90	....	1/5	5,000	...	......	......	......	14	8	.....	Beam
K & B Torpedo	B	.299	7.50	1.51	1	.725 x .724	1.00—	6.90	.257	10'500	...	......	......	......	11 8	6 10	9,200 10,800	Bm.-Rd.
O. K. "29"	B	.299	5.50	1.15	1	.760 x .660	.87	6.00	1/6	9,000	1/6	9,000	.557	2.06	11	6	8,500	Bm.-Rd.
Mohawk Chief	B	.299	7.00	1.46	1	.760 x .660	.87	....	...	......	...	......	......	......	..	.	.....	Beam
De Long "30"	B	.300	8.00	1.67	1	.750 x .680	.91	10.00	1/5	8,000	...	......	......	......	11-9	8-10	.....	Beam
Vivell "35"	C	.351	7.25	1.29	1	.765 x .763	1.00—	....	1/5	9,000	...	......	......	......	11	6	9,500	Beam
Cannon "358"	C	.359	6.50	1.13	1	.750 x .812	1.08	......	1/4	5,500	...	......	......	......	14	8	.....	Beam
Elf Four	C	.380	9.00	1.45	4	.468 x .564	1.21	7.00	1/3	8,000	...	......	......	......	13	5-7½	7,800	Radial
Air-O-Mighty Midget	C	.451	7.25	1.00	1	.875 x .750	.86	8.00	1/6	12,400	...	......	......	......	9	9	10,000	....
Rocket	C	.454	9.00	1.24	1	.812 x .875	1.08	......	...	......	...	......	......	......	..	.	.....	Beam
Madewell "49"	C	.488	9.00	1.15	1	.801 x .783	.88	5.24	.60	15,000	...	......	......	......	12-13 9	6-5 8-10	10,000 12,000	Beam
Vivell "Forty-Niner"	C	.489	7.50	.96	1	.859 x .844	.98	....	1/4	10,000	...	......	......	......	11	8	10,000	Beam
McCoy RedHead, Jr.	C	.491	10.00	1.27	1	.890 x .790	.89	7.50	.80	14,000	...	......	......	......	9	10	13,000	Beam
G. H. Q.	C	.518	10.00	1.21	1	.937 x .750	.80	8.00	1/5	7,000	...	......	......	......	14	8	7,000	Beam
Vivell "Twin"	C	.569	14.00	1.54	2	.726 x .687	.95	......	3/8	9,000	...	......	......	......	12	6	9,000	Radial
Dennymite	C	.573	11.00	1.20	1	.900 x .900	1.00	5.50	...	......	1/4	6,800	.436	2.75	13-14	.	6,500	Beam
Fox	C	.593	9.50	1.00	1	.937 x .860	.92	6.00	4/5	10,000	1.00	15,000	1.686	.59	..	.	.....	Beam
Contestor, D	C	.596	11.00	1.15	1	.945 x .850	.90	......	1/2	7,000- 14,000	...	......	......	......	..	.	.....	Beam
Wasp-Twin	C	.604	9.50	.98	2	.740 x .702	.95	7.00	1/2 Est.	10,000 Est.	...	......	......	......	10-11	.	7,000- 10,000	Beam
Scout Twin	C	.604	11.00	1.14	2	.740 x .702	.95	7.00	.40	8,500	...	......	......	......	10	8	8,500- 9,200	Beam
Anderson Spitfire	C	.604	12.00	1.24	1	.937 x .875	.93	6.00	1/2	10,000	...	......	......	......	13	8	10,000	Beam
Ball, BC	C	.604	15.00	1.55	1	.924 x .900	.97	10.00	...	......	1.00+	20,000	1.656+	.938	9	12	.....	Beam
Fleetwind	C	.604	11.50	1.21	1	.937 x .875	.93	6.00	...	......	.415	8,400	.687	1.73	12	8	8,400	Beam
Hornet "60-A"	C	.604	14.00	1.45	1	.937 x .875	.93	12.00	...	......	.82	13,800	1.358	1.07	9	12	15,000	Beam
Junior Motors "60"	C	.604	9.50	.98	1	.937 x .875	.93	8.00	1/4	8,000	...	......	......	......	..	.	.....	Beam
Ken "610"	C	.604	15.50	1.60	1	.937 x .875	.93	......	3/5	14,000	.60	14,000	.993	1.61	..	.	.....	Beam
Ohlsson "60"	C	.604	9.00	.93	1	.937 x .875	.93	6.00	1/4	7,500	...	......	......	......	13	8	.....	Bm.-Rd.
O. K. Super "60"	C	.604	12.00	1.24	1	.900 x .950	1.07	6.00	1/3	8,750	1/3	8,750	.552	2.25	14	6	8,500	Beam
Super Cyclone	C	.604	9.50	.98	1	.906 x .937	1.03	6.00	1/4	6,000- 7,000	...	......	......	......	12 13-14	10 6-8	6,000- 9,000	Beam
Dooling "61"	C	.607	14.00	1.44	1	1.015 x .750	.74	9.50	1.35	15,500	...	......	......	......	8-9	9-11	16,000	Beam
McCoy	C	.607	14.00	1.44	1	.940 x .875	.93	8.00	9/10+	14,000	...	......	......	......	9	10	14,400	Beam
Super Champion, JH	C	.624	12.00	1.20	1	.940 x .900	.96	6.50	.65	12,500	...	......	......	......	13	6-8	8,000- 8,500	Beam
Thunderbird	C	.645	13.00	1.26	1	.968 x .875	.90	6.00	...	......	...	......	......	......	10	10	11,000	Beam
Orr "65"	C	.647	12.75	1.23	1	.937 x .937	1.00	12.50	.85	13,500	...	......	......	......	..	.	.....	Beam
Viking "65"	C	.648	11.00	1.06	2	.812 x .625	.77	......	1/2	8,500	...	......	......	......	..	.	.....	Radial
Molnar	C	.785	16.00	1.27	1	1.000 x 1.000	1.00	5.30	...	......	...	......	......	......	15-16	.	12,000	Beam
Forster Super "99"	C	.997	14.00	.94	1	1.062 x 1.125	1.06	8.50	...	Alcohol Gasoline	.69 .62	7,800 7,000	.692 .622	1.27 1.37	14-16 18-20	8 6-5	4,500- 6,800	Radial
O. K. Twin	C	1.208	22.00	1.15	2	.900 x .950	1.07	6.00	1/2	5,675	1/2	5,675	.414	2.75	18	8	5,000	Radial
Avion Mercury "45"		1.609	20.00	.78	1	1.250 x 1.312	1.05	9.43	7/10	3,800	3/4	4,000	.466	1.67	20	10	4,000	Beam

COMPRESSION—IGNITION ENGINES

	Class	Displacement Cu. In.	Bare Engine Weight, Ozs.	Weight per Cu. In. Disp., Lbs.	No. of Cylinders	Cylinder Bore and Stroke	Stroke-Bore Ratio (to 1)	Cylinder Compression Ratio (to 1)	Rated Horsepower	Revolutions per Minute at Rated Horsepower	Maximum Brake Horsepower	Revolutions per Minute at Max. Brake H.P.	Max. Brake H.P. per Cu. In. Disp.	Engine Weight per Brake H.P., Lbs.	Recommended Propeller Dia., In.	Recommended Propeller Pitch, In.	Revolutions per Minute with Recommended Prop.	Type of Mount
C. I. E.	A	.147	5.50	2.34	1	.500 x .750	1.50	....	...	......	...	......	......	......	9	6	6,000	Lug & Radial
Air-O-Diesel	B	.278	7.00	1.57	1	.687 x .750	1.09	Variable	1/5	6,500	.25+	16,500	.898+	1.75—	12 11	8 10	7,000 7,000	Beam
DeLong Diesel	B	.295	10.00	2.12	1	.680 x .812	.90	Variable	...	......	...	......	......	......	11	8	.....	Beam
Speed Demon	B	.296	10.50	2.22	1	.656 x .875	1.33	12.00 to 20.00	1/5	6,000	...	......	......	......	11	8	6,100 to 7,500	Beam
Drone Gold Crown	B	.296	10.00	2.11	1	.656 x .875	1.33	18.00	1/5	6,100	...	......	......	......	9 to 14	4 8	8,400 4,400	

HOT COIL IGNITION ENGINES

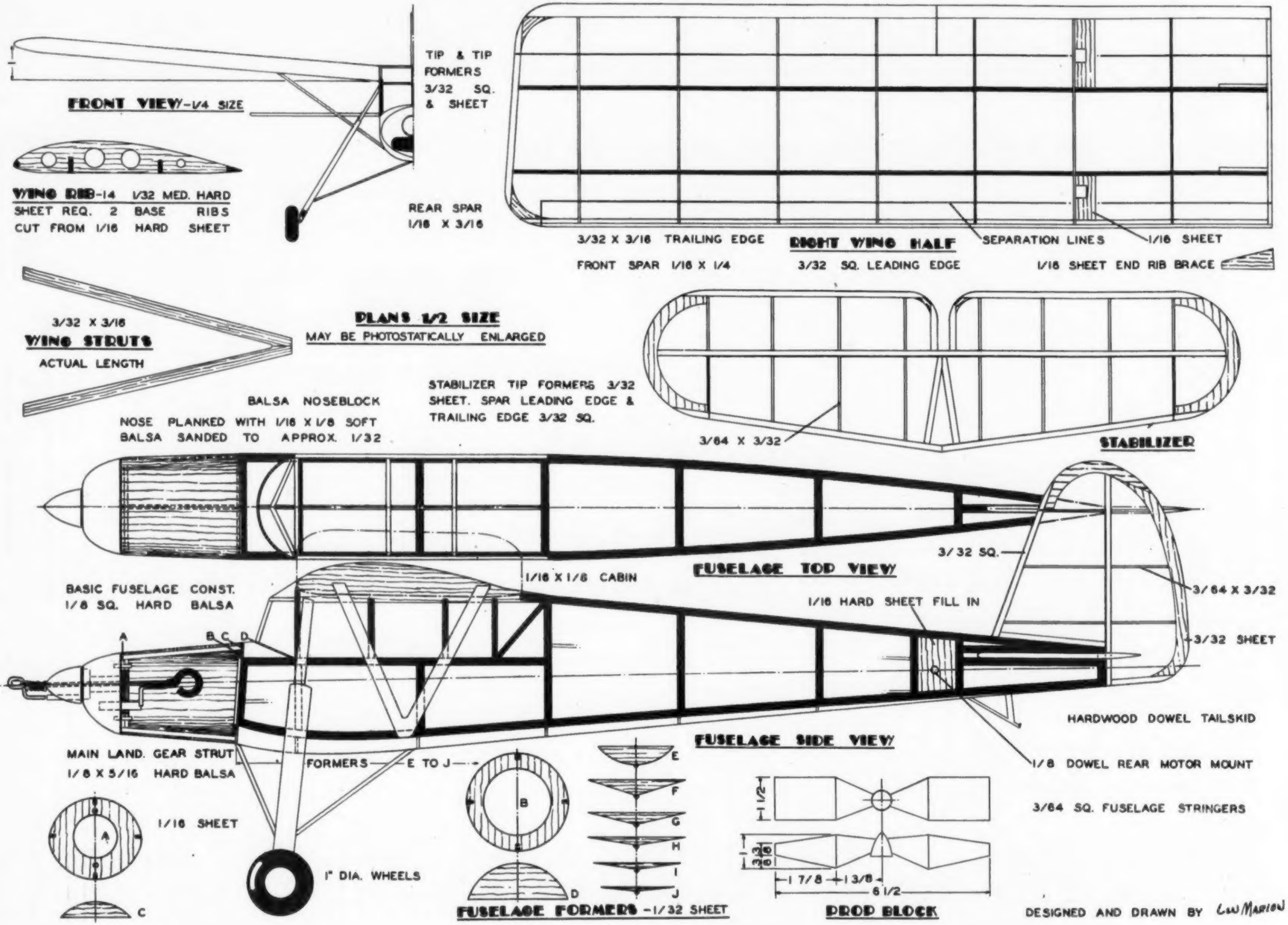
	Class	Displacement Cu. In.	Bare Engine Weight, Ozs.	Weight per Cu. In. Disp., Lbs.	No. of Cylinders	Cylinder Bore and Stroke	Stroke-Bore Ratio (to 1)	Cylinder Compression Ratio (to 1)	Rated Horsepower	Revolutions per Minute at Rated Horsepower	Maximum Brake Horsepower	Revolutions per Minute at Max. Brake H.P.	Max. Brake H.P. per Cu. In. Disp.	Engine Weight per Brake H.P., Lbs.	Recommended Propeller Dia., In.	Recommended Propeller Pitch, In.	Revolutions per Minute with Recommended Prop.	Type of Mount
H & H	C	.451	8.00	1.11	1	.875 x .750	.86	....	...	......	...	......	......	......	10-12	8	.....	Beam

FOUR-CYCLE ENGINES (SPARK-IGNITION)

	Class	Displacement Cu. In.	Bare Engine Weight, Ozs.	Weight per Cu. In. Disp., Lbs.	No. of Cylinders	Cylinder Bore and Stroke	Stroke-Bore Ratio (to 1)	Cylinder Compression Ratio (to 1)	Rated Horsepower	Revolutions per Minute at Rated Horsepower	Maximum Brake Horsepower	Revolutions per Minute at Max. Brake H.P.	Max. Brake H.P. per Cu. In. Disp.	Engine Weight per Brake H.P., Lbs.	Recommended Propeller Dia., In.	Recommended Propeller Pitch, In.	Revolutions per Minute with Recommended Prop.	Type of Mount
Burgess M-5, Radial	C	.942	22.00	1.46	5	.632 x .600	.95	5.50	1/2	3,500	...	......	......	......	..	.	.....	Radial

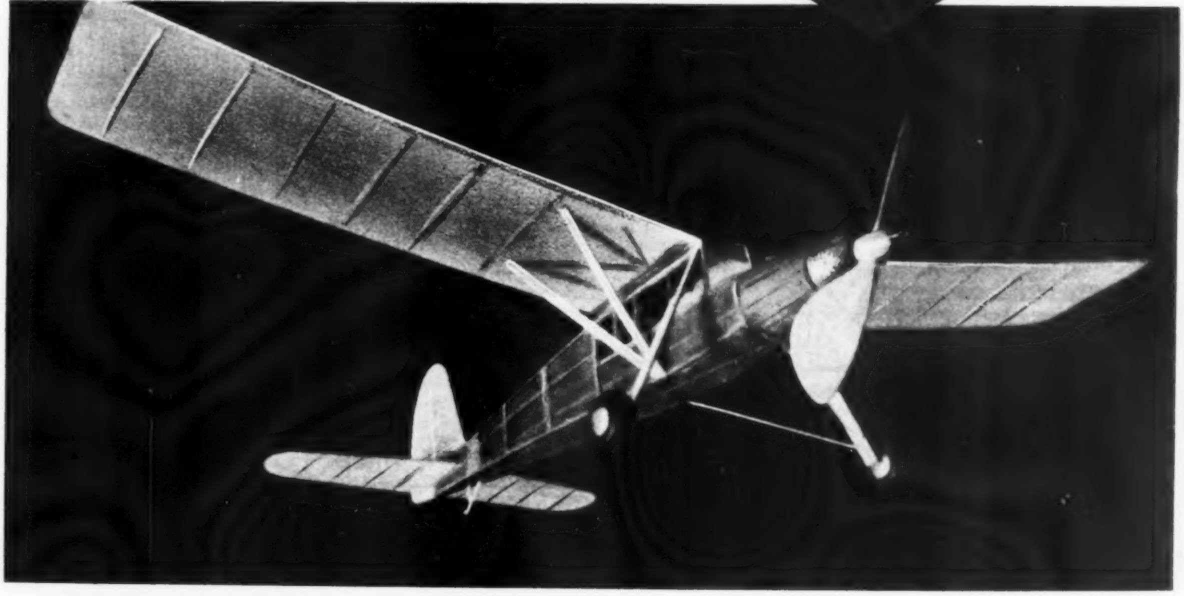
CARBON DIOXIDE ENGINES

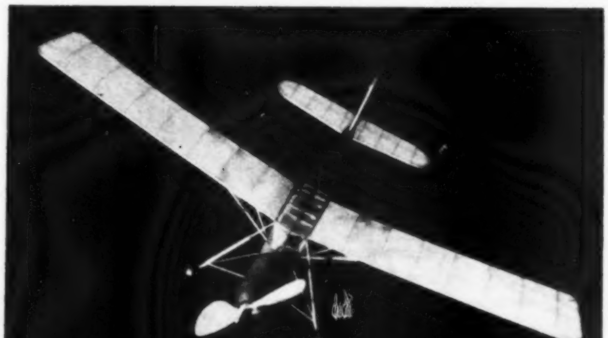
	Class	Displacement Cu. In.	Bare Engine Weight, Ozs.	Weight per Cu. In. Disp., Lbs.	No. of Cylinders	Cylinder Bore and Stroke	Stroke-Bore Ratio (to 1)	Cylinder Compression Ratio (to 1)	Rated Horsepower	Revolutions per Minute at Rated Horsepower	Maximum Brake Horsepower	Revolutions per Minute at Max. Brake H.P.	Max. Brake H.P. per Cu. In. Disp.	Engine Weight per Brake H.P., Lbs.	Recommended Propeller Dia., In.	Recommended Propeller Pitch, In.	Revolutions per Minute with Recommended Prop.	Type of Mount
O. K. CO2	..	.0178	.75	2.63	1	.275 x .300	1.09	....	...	7,000	...	......	......	......	8	3	.....	Radial
Campus A-100	..	.0015	.25 total	....	1	.125 x .125	1.00	5.00	.0015	8,000	...	......	......	......	4	2	4-8,000	Radial


FRONT VIEW-1/4 SIZE
TIP & TIP FORMERS 3/32 SQ. & SHEET
REAR SPAR 1/16 X 3/16
WING RIB-14 1/32 MED. HARD SHEET REQ. 2 BASE RIBS CUT FROM 1/16 HARD SHEET
3/32 X 3/16 TRAILING EDGE
FRONT SPAR 1/16 X 1/4
RIGHT WING HALF
3/32 SQ. LEADING EDGE
SEPARATION LINES
1/16 SHEET
1/16 SHEET END RIB BRACE
3/32 X 3/16
WING STRUTS
ACTUAL LENGTH
PLANS 1/2 SIZE
MAY BE PHOTOSTATICALLY ENLARGED
STABILIZER TIP FORMERS 3/32 SHEET. SPAR LEADING EDGE & TRAILING EDGE 3/32 SQ.
3/64 X 3/32
STABILIZER
BALSA NOSEBLOCK
NOSE PLANKED WITH 1/16 X 1/8 SOFT BALSA SANDED TO APPROX. 1/32
FUSELAGE TOP VIEW
3/32 SQ.
1/16 X 1/8 CABIN
BASIC FUSELAGE CONST. 1/8 SQ. HARD BALSA
1/16 HARD SHEET FILL IN
3/64 X 3/32
3/32 SHEET
A
B C D
HARDWOOD DOWEL TAILSKID
FUSELAGE SIDE VIEW
MAIN LAND. GEAR STRUT 1/8 X 5/16 HARD BALSA
FORMERS
E TO J
1/8 DOWEL REAR MOTOR MOUNT
3/64 SQ. FUSELAGE STRINGERS
1/16 SHEET
A
B
C
D
E
F
G
H
I
J
1" DIA. WHEELS
FUSELAGE FORMERS -1/32 SHEET
1 1/2
1 7/8
1 3/8
6 1/2
PROP BLOCK
DESIGNED AND DRAWN BY Lou Marion

FIESELER STORCH

An outstanding prewar ship, the *Storch* has ideal proportions for modeling





by LEN MARLOW

THIS pre-war German lightplane, it will be noted, bears more than a little resemblance to the famed Curtiss *Robin*. Like the *Robin*, it also offers the model builder an opportunity to produce a truly fine flying scale. With the exception of slightly increased dihedral and incidence—and, of course, the omission of "fancy" details—the adherence to actual scale is as close as the available drawings and photographs would permit.

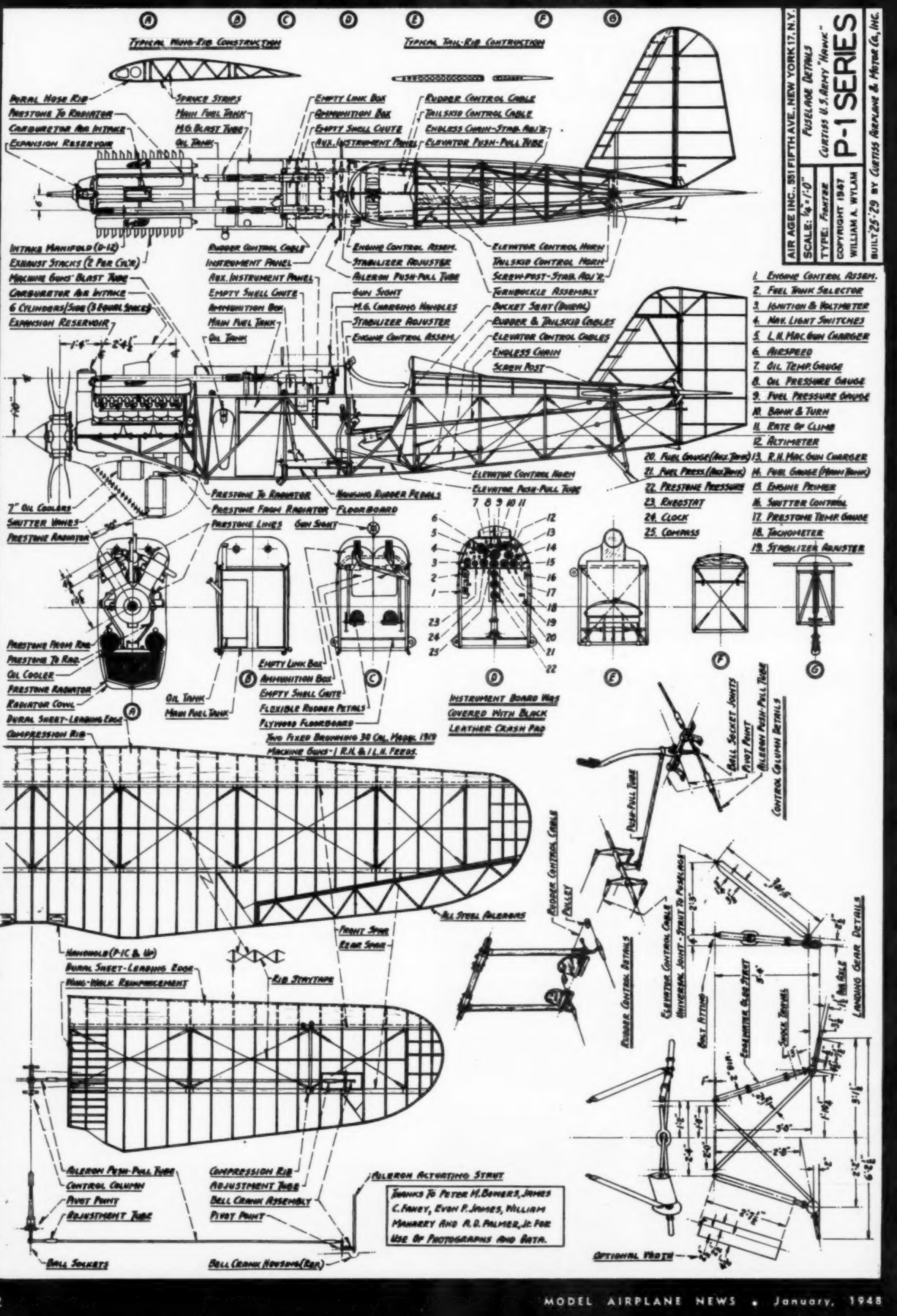
To begin construction, cut out two of the 1/16" sheet formers to which the wing base is cemented. Pin one of these in place over the side plan view and add the 1/8" sq. hard balsa longerons and uprights, and the 1/16" x 1/8" cabin members, all of which are indicated by heavy black lines. It will be found necessary to soak the lower longeron in water in order to correctly form the required curve. After pinning this longeron in place allow it to dry *thoroughly* before cementing the uprights. Two sides are built in this manner, the second directly on top of the first for accuracy.

When the two sides have been completed, remove them from the plans and add the 1/8" sq. crossbraces and 1/16" sq. upper cabin members as shown on top plan view, working from front to back. Cut from 1/16" rock hard sheet and cement in place the two rear mounts which hold the 1/8" dowel motor mount. The fuselage formers are cut from 1/32" medium hard sheet and cemented in place, the lower formers being lightly nicked to take the 3/64" sq. stringer. Stringers of the latter size are also added to the sides, as indicated on the plans (for these and for other specified sizes which may not be available, substitute the nearest size or sand it to the required dimensions).

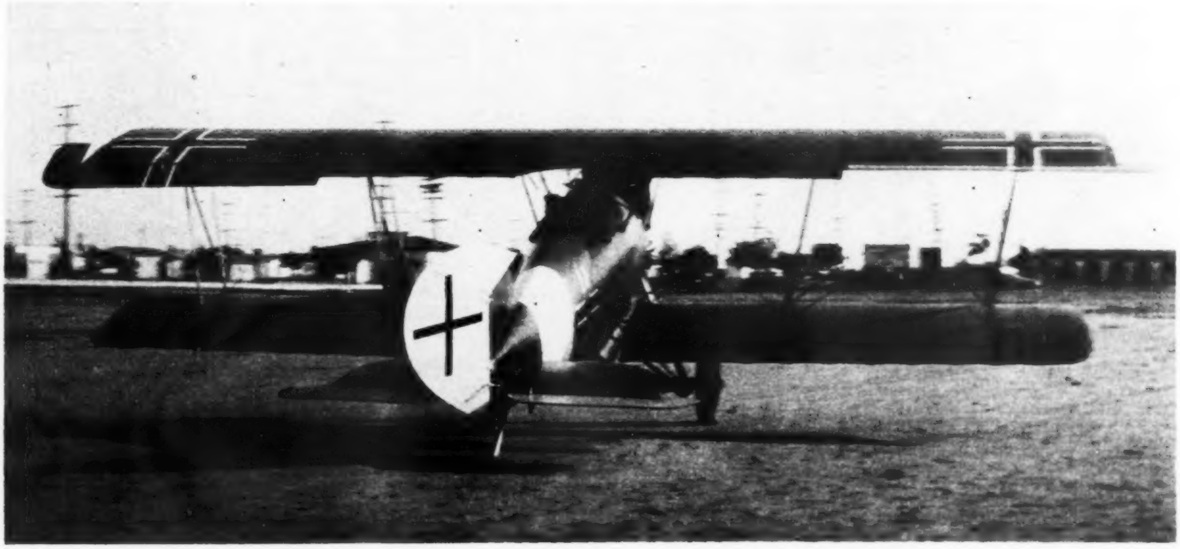
In building up the nose section, lay out two strips of 1/16" x 3/32" over the side plan view. Cut two "A" formers from 1/16" sheet and cement together crossgrain (be sure to save the two circular sections cut from the center of these formers, as they will later be used to hold the noseblock in place). Cut one "B" former from 1/32" sheet. Split the two formers in half along the center line shown

(*Turn to page* 42)

This page concludes the Curtiss P1 series



WYLAM MASTERPLAN • WYLAM MASTERPLAN



A reconstructed Pfalz D. XII taxying in a strong wind; note extreme positions of rudder and ailerons

WORLD WAR I

by ROBERT C. HARE

GERMANS held great hopes for victory over the Allies in the spring of 1918. Government propaganda agents had whipped the German people's spirits to a high pitch and managed to convince them that the Fatherland's military position was stronger than ever.

They pointed to von Hindenberg's plan for a terrific offensive towards Paris, and support from German troops released from the Northeast after the collapse of Russia late in 1917. They singled out the weariness of Allied troops as another factor, the lack of promised aid from America as an additional element. Reorganization of the air arm, admission of non-commissioned officers to pilot status, and a promise of new airplanes proved to be a lift for the ranks, caused grumbling among officer pilots. Rationing in earnest entered the economy at home—everyone was in it, everybody had his shoulder to the wheel. This was the shining hour of the Fatherland in its struggle against the world.

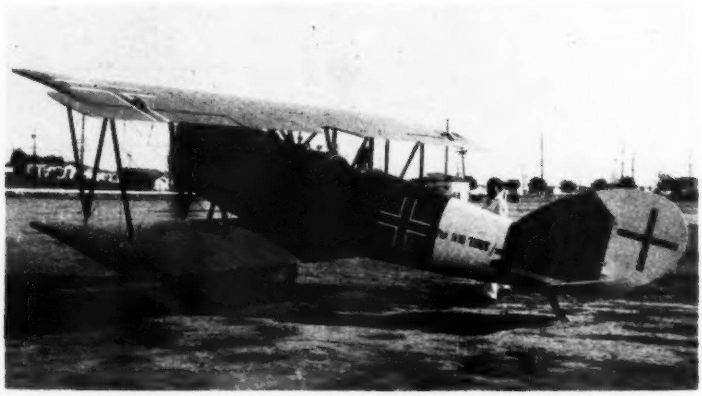
Under the new air force plan, the Imperial Air Service was systematically romanticized to the nation as a whole. The air arm got more than its share of publicity, its pilots got more than their share of decorations. A simplified method of confirmation made victories easier to claim. New pilots increased their scores amazingly, but the experienced pilots knew what was happening. This was the last swing of a fighter who was out on his feet.

With the new pilots and easy confirmation came new airplanes—actually the finest Germany had produced. Of the single seat fighters, the Fokker D.VII was queen; everyone wanted a D.VII, and this excellent biplane was the white hope of a last great effort.

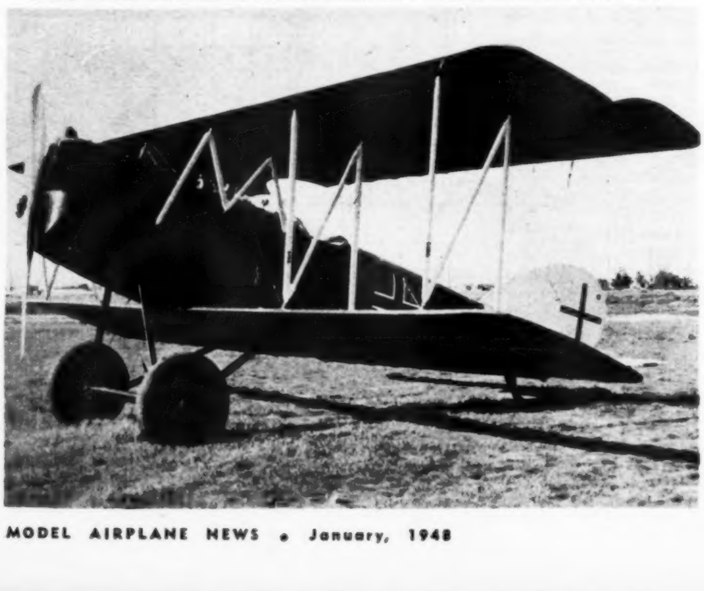
The D.VII was chosen as the best fighter in an open competition for the class held at the Imperial Air Service's "Wright Field"—Aldershoff—early in 1918. The idea was to mass-produce the D.VII in an effort to get the war in the air over with in a hurry. Contracts were let to other manufacturers to supply huge quantities of the ship, but details of production plagued its builders. Output lagged, and many squadrons which were slated for D.VIIs by mid-1918 were still flying obsolete equipment.

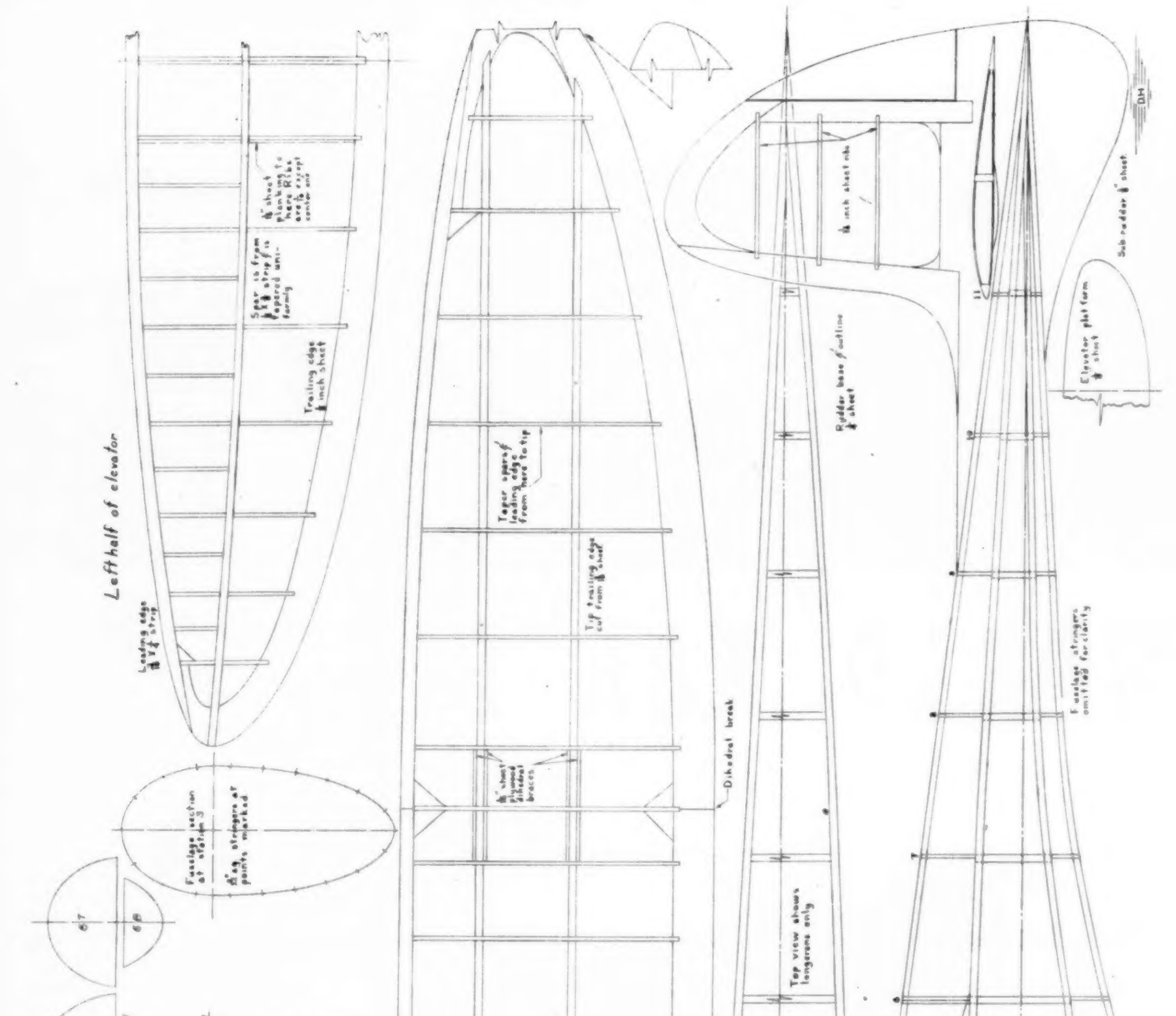
Somewhere along the line, however, someone had the foresight to realize production might be wanting on the D.VII, and following

(*Turn to page* 56)



The same ship with 180 hp Mercedes engine warming up. (Below) The D. XII had a very thin airfoil, beautiful fuselage lines, but a maze of struts and brace wires




HOT-SHOT
Class "D" Towline Sailplane
Right half of wing
Left half of elevator
Dihedral break
Top view shows longerons only
Clark "Y" airfoil
Lower longeron
Upper longeron
Fuselage stringers omitted for clarity

by DICK HOLLOWAY

HOT SHOT

A sailplane designed for top performance in the winds of Kansas

HERE is a model sailplane (not a glider) designed to combine beauty and efficiency. This plane was designed and built well over a year ago and is still going strong, a fact which speaks for itself in windy Kansas.

The first meet in which the ship was entered was the 1946 Nationals. In two test flights in the early morning the ship hopped thermals twice for flights of almost 9 min. 6 sec. duration. During the mild cyclone which arose later, one wing panel was demolished when the ship cracked a spectator across the shins. The plane was rebuilt and has been found capable of many fine flights under any conditions.

Construction is conventional throughout. Start with the fuselage, which is the only part that offers any difficulty. The two fuselage sides are built one over the other to assure identity. When dry, these are joined by 1/8" square crosspieces which are beveled on the ends to allow the fuselage to assume its trapezoidal crossection. Start inserting the crosspieces at the center of the fuselage, working first toward the tail, then the nose of the plane. Keep the work aligned at all times.

When the skeleton framework is dry, add the 1/16" balsa sheet bulkheads and make the space between bulkheads 1 and 2 into a ballast box. Be sure to glue in two each of bulkheads 3T and 6T. Add the desired number of 3/32" square hard balsa stringers, spacing them evenly around the fuselage in notches cut for them. The original model has 22 full length stringers. Scallop the bulkheads so they will not touch the covering.

Next, glue the noseblock, rudder and sub-rudder in place and sand all parts until a smooth covering is assured. Cut the elevator slot in the rudder base and glue in the elevator platform. To complete the fuselage, add the three iron wire (paper clip wire is fine) tow-hooks at the points shown on plans.

The wing is of simple construction and should present no difficulties. A flat centersection combined with tip dihedral of 5" produces excellent results. Be sure to make the dihedral joints very strong. The centersection of the wing is covered with 1/16" sheet balsa.

The single curved spar in the elevator has proved sufficient for the thin airfoil. Glue all joints well and let dry overnight to prevent warping. Plank the centersection with 1/16" sheet balsa, for the elevator is held onto the fuselage only by a snug fit with the slot in the rudder base.

To make the removable wing-fuselage junction unit, start by cutting the top stringers through at bulkheads 3T and 6T. Remove these sections of stringers and bulkheads 3T, 4T, 5T and 6T. Cut the leading and trailing edges of the wing until it will fit easily in the space provided.

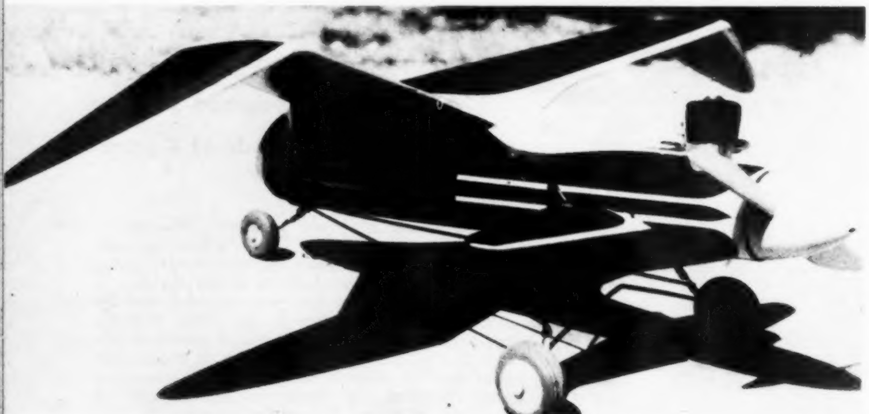
Cut the stringers and bulkheads until the removed section sets smoothly on the wing and lines up correctly with the rest of the fuselage. Before gluing the unit together, check to see that the wing has the correct incidence and is in alignment with the rest of the ship.

On the original model the wing is held in place with springs inside the fuselage attached to hooks in the bottom of the wing, and is locked with four dress snaps glued on the contact surfaces of the wing and fuselage units. This attachment allows a perfectly clean outer surface with

(*Turn to page* 75)

No. 1 World War I Bristol F-2B built by John T. Leamon of Connecticut

No. 2 Louis Poirrier's *Flyin' Saucer*



No. 3 Elmer R. Cox's ingenious version of a tail first ship featuring dolly takeoff

No. 4 Aussie gas job from James Tangney

No. 5 Gordon E. Codding's *Jet-Wing* is free-flight and jet powered

No. 6 Ed Lindahl's model is powered by an O.K. CO2

AIR WAYS

NEWS OF MODEL AIRPLANE EXPERIMENTERS ALL OVER THE WORLD

PAYMENT FOR LOSSES. While the AMA sells very cheap insurance to cover the model builder against damage to other people's property, many modelers —especially those who participate in contest flying—would like some form of insurance to compensate for loss or damage to their models.

R. H. Williamson of Allentown, Pa. comes up with the idea that such insurance be provided by the management of each meet, by charging a small parking or program fee. He points out that many spectators are the bloodthirsty type who attend model meets mainly to see the crackups, so it is only right that they finance the insurance for the unfortunate builders.

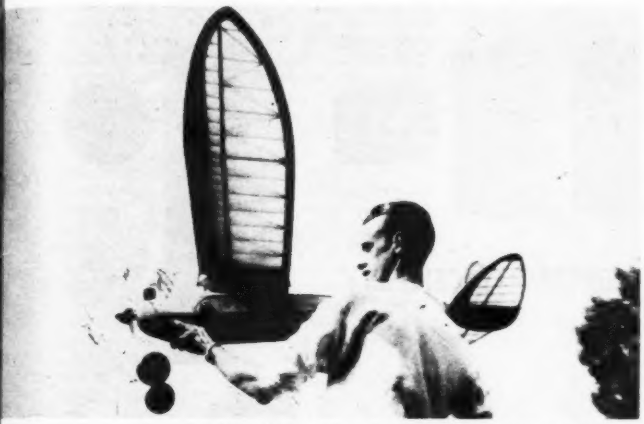
While there may arise protests at the difficulty of engineering such a plan, it could probably be reduced to a fairly simple formula. Set rates of payment might be worked out for each style of model—such as rubber, glider or gassie, and possibly also for the class of model. There could not of course be any value set or paid for the time and skill the builder put in his ship, but even so he would surely appreciate payment covering a motor, airwheels, timer etc. on a model which flew away. If any individual or club has worked out such a scheme we would like to receive details.

THE CHAMPS GO ON RECORD. Bill Sweet of the *Thermal Thumbers*, National Champion Club for this season, sent in their recommendations regarding the controversial free flight gas rules:

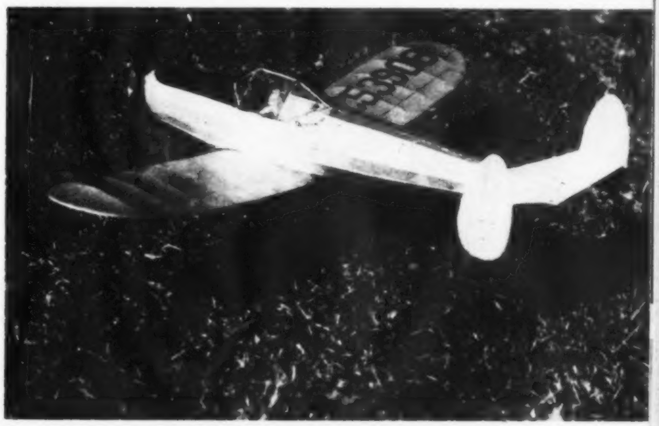
1. Eliminate wing loading completely.
2. Eliminate crossection requirements completely.
3. Raise power loading to 120 oz. (or more) per cu. in. engine displacement.
4. Limit flights to 10 min.

No. 7 *Sailwing 50* built by Wallace P. Howell of Washington

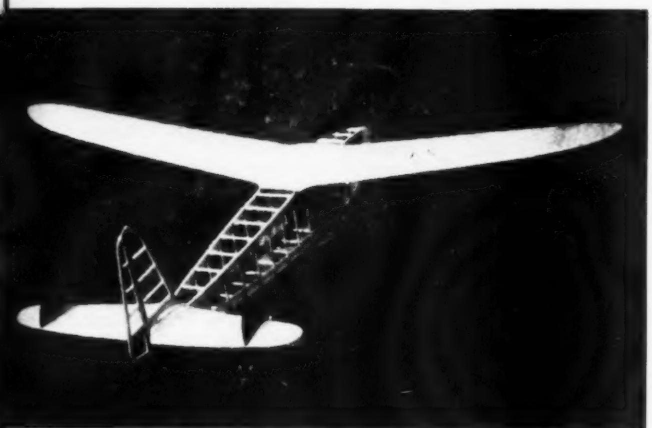
No. 8 Albert C. Smith's *Columbia XJL-1*



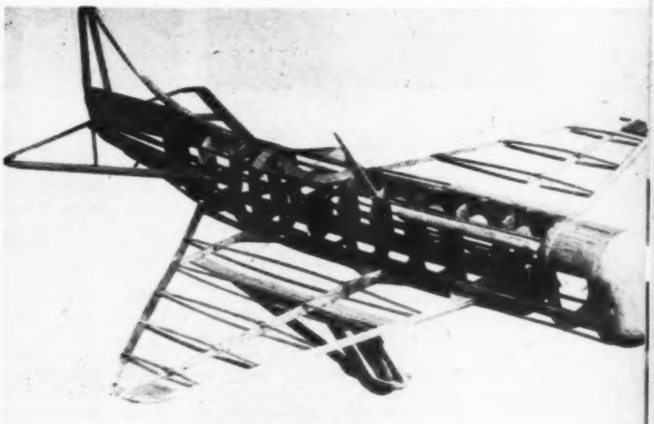
No. 9 *Gas Champ* constructed by Albert Cooper of Canada



No. 10 *Ercoupe* rubber job built by Anton E. Arnoste of Wisconsin



No. 11 Alfred Wong of Hong Kong built this Wakefield



No. 12 Framework of a speed model by Ronald Walker of England

5. Landing gear to be optional.
6. Retain both outdoor stick and fuselage.

Presumably the AMA rules for next year will be announced shortly, but it is interesting to see that one well known club has formulated a definite program and is willing to back it up.

HYDRO TIPS AVAILABLE. We are glad to learn that the booklet *Hydro Tips*, mentioned in this column last month, will be available from AMA headquarters. Prepared by the *Brainbusters* in connection with their recent highly successful Hydro Championships at Hampton, Va., the booklet contains hints on float design, with drawings and data on both rubber and gas powered hydro models. Because the supply is limited it is requested that only those really interested in hydro design write for them, and also that 5c be included to cover costs.

While actual announcement has not been made, we believe there will also be available from AMA reprints of the many fine papers presented at the recent Technical Conference also sponsored by the *Brainbusters*. These papers were prepared by leaders in all fields of model aviation and we feel they are of great value to all builders interested in the scientific aspects of the hobby.

MODEL POWERPLANTS. A survey that may become an annual occasion at about this time of year will be found in this issue. We refer to the comprehensive coverage of model power units starting on page 16. The list is much longer this time than it was a year ago, due to the inclusion of many diesels, as well as jet and CO2 engines. Sad to say, many engines on the 1946 list have been omitted since they are no longer made. Only those motors that are definitely available in the market today will be found listed.

Incidentally, some manufacturers have brought out new models, so that even though a motor was on the last chart and is not in the present one it is not necessarily an "orphan"; parts and service on many of the discontinued motors are still to be had.

* *

Picture No. 1 is a World War I ship, Bristol F-2B, built by John T. Leamon, student at Connecticut College, New London. It was constructed to the scale of 1/2" to the foot and is a complete replica of the original. All equipment—guns, rotary motor, pilot, etc. were made by Mr. Leamon, the wheels being the only material purchased.

Louis Poirrier, 106 Eagle Ave., Pasadena, Tex. submitted No. 2. This unusual invention is known as the *Flyin' Saucer*

(*Turn to page* 65)

BATTERIES FOR RADIO CONTROL

BATTERIES MOST COMMONLY USED . . . RADIO CONTROL (RECEIVERS)

by E. J. LORENZ

BATTERIES — which one shall I use? Will one penlight cell be enough? What is the smallest 45-volt battery obtainable?

These are only a few of the questions asked by a person starting on radio control of model airplanes. As batteries constitute the bulk of the weight and space in a radio control receiver, this article will deal exclusively with power requirements for receivers. A large percentage of radio control transmitters in operation today are battery-powered, but since weight and space are not so critical, the larger the battery the better.

Before continuing, a word about charts. They are self-explanatory and all computations were made under laboratory conditions with standard fresh batteries. Field tests and flights also were made to substantiate the laboratory figures. Since Eveready and Burgess make the only complete line of small batteries suited to all phases and types of radio control models, these batteries are the ones used for compiling data on the 45-volt "B" supply. All makes were tested and the results averaged, since the values were close.

There is one other type cell which may prove to be very popular for radio control use: the Mallory mercuric-oxide cell which made its debut during the war. At present they come in two sizes: 1" diameter x .671 high; and 1-1/4" diameter x .575 high; they weigh 1 ounce and 1-1/4 ounce respectively. Tests are now being made to ascertain their value for radio control work.

The peak voltage of these mercuric-oxide cells, which varies under load, is but 1.3 volts at maximum. This should not be a detriment since tests have been run on receivers using an RK-61 tube with a filament voltage as low as 1.05 volts. With proper adjustments in the circuit, the tube and receiver continued to function perfectly all the way from 1.3 down to 1.05 volts.

The cells themselves are compact in design and have a steel outer case, which is the positive terminal. They are non-corroding and their method of construction and design give them an exceedingly long life at moderate current drains (up to about 200 milliamperes). At current drains of 50 to 125 mils, their life is up to 100 times that of pencells or intermediate size flashlight cells.

The majority of model builders seem to be interested in what is best as to size, weight and workability. This being the case, the technical workings of wet and dry cells will be passed over and just the highlights, such as the everyday practical information on batteries, will be given. Those desiring detailed information on these two type cells may obtain it from high school text books or at the library.

As most modelers know, one "battery" or cell, has a theoretical potential of 1.5 volts for the "dry cell type" and 2.1 volts for the lead-acid type wet cell. Due to improved mixes now used in dry cells, all of those tested were over 1.5 volts, some being as high as 1.75 volts. The wet cells, fully charged, were up as high as 2.5 volts per cell. Even though the initial voltage on cells may be high, it drops off rapidly, and the cell then maintains a fairly steady though somewhat lower voltage output. This downward voltage curve becomes steeper as the current drain is increased. By adding cells in parallel, the current drain per cell is less, and due to the given resistance in the circuit a higher voltage is maintained over a greater period of time. Hence it is best to use as large a battery, or group of cells, as possible. The life of the battery, consisting of a group of cells connected in parallel, is greater than it would be if the same number of cells were used individually, although the voltage remains the same in either case.

Perhaps you have noticed that your batteries seem to hold up better during summer than during cold winter flying. Heat increases the chemical action of all cells and thus temporarily increases the cell output. All cells are tested at a standard temperature of 70° Fahrenheit. The voltage of a cell increases approximately .01 volts for each 13° F. rise. The amperage also increases, but this varies with size of the cell. When the temperature of a cell is increased, the voltage/current characteristics are increased and take on the capacity for that temperature. The maximum temperature for this is approximately 105° to 115° F. When a cell has been overheated, for one reason or another, lowering its temperature will decrease its capacity; subjecting a cell to low temperature also decreases its capacity. Although any temperature above 20° will not harm batteries for model work, it is interesting to know that at

15° to 20° below zero, a cell has only about 15% to 25% of its rated capacity, as measured at 70°. Keep your cells and batteries in a cool place in order to prolong their shelf life. Continual warm or hot temperatures will increase local action in the cell itself and also contribute to loss of moisture.

A given size cell is rated at a certain current drain. An attempt to obtain a higher current drain will only tend to heat the cell and thus shorten its life. For example, an attempt to draw three amperes from a penlight cell will result in a life for the cell of but a few minutes. It will also become warm to the touch. But three amperes drawn from a large number six dry cell will have little or no effect on the cell for the same period of time. This heating of a cell, under high current drain, is due to internal resistance of the cell. The smaller the individual cell, such as used in small hearing aid batteries, the greater should be the care in seeing that the current drain for that size cell or battery is not exceeded, in order that maximum life be obtained from the battery. Of course if economy of operation is of no importance, a larger current drain may be used, but it will be available for a much shorter period of time.

As stated before, the charts are self-explanatory as to current drain and voltage at any desired time. All tests were continuous and therefore the life of the cell or battery will be greatly increased if used intermittently. The actual total life will depend, of course, on how long the cell or battery has been "on" compared to its "off" period.

Dry cell type batteries cannot, as a general rule of theory, be recharged after they have been in use for any length of time. They can, however, be boosted temporarily by placing them across a larger capacity battery for a short time. The negative terminal of the smaller battery must be connected to the negative terminal of the larger, and likewise for the positive terminals. For example, if you employ the usual two cells in series as a flight battery, use three No. 6 dry cells in series as a booster. Also, have your booster plugs so arranged that the booster will always be connected directly across the flight battery whenever used.

A dry type cell will "recharge" itself, due to the depolorization action of the mix, when left disconnected after having been in use. This accounts for the much longer life obtained from cells and batteries when they are used intermittently instead of for continuous duty.

The radio control enthusiast would do well to look into wet type cells for low voltage power sources. The prime advantage of this type cell is the high ampere capacity, resulting in longer life, as compared to a comparable size dry cell. As a power source for ignition escapements, solenoids or motors, the author has found them unexcelled. The main disadvantage of wet type cells is the spilling of the electrolytic and the fact that they need to be charged. The first item may be solved one of these days, thereby making a wet cell as "dry" as a dry type cell. The second item should be of little concern to the model builder since all that is needed is an inexpensive charger which the modeler can make or purchase from most of the manufacturers of these type batteries. Since all wet type cells are sold in a dry condition, the electrolytic, as specified by the particular manufacturer, must be added and the battery then recharged. Once the liquid

(*Turn to page 62*)

BATTERY DRAIN CHART

BATTERY	NUMBER	INITIAL VOLTAGE	CURRENT DRAIN	END POINT VOLTAGE	LIFE IN MINUTES	REMARKS
EVEREADY "AA"	915	1.65	50 ma.	1.2	88	NEW TYPE CELL
EVEREADY "AA" SINGLE CELL	1016-E	1.62	80 ma.	1.2	95	HEARING AID CELL WITH LONG LIFE "MIX."
EVEREADY "AA" TWO CELLS	1016-E	1.62	80 ma.	1.2	280	CONNECTED IN PARALLEL
EVEREADY "C"	935	1.65	80 ma.	1.2	425	NEW TYPE CELLS
MALLORY	RM8-3	1.3	80 ma.	1.1 1.2	16 HRS. 4 HRS.	MERCURIC OXIDE CELL
MALLORY	RM82-4	1.3	80 ma.	1.1 1.2	25 HRS. 4 HRS.	MERCURIC OXIDE CELL
BRIGHT STAR "AA"	F59	1.65	100 ma.	1.2	105	2 PHOTO FLASH CELLS; CONNECTED IN PARALLEL.
RAY-O-VAC "C"	1-LP	1.6	100 ma.	1.2	140	
EVEREADY	950	1.62	100 ma.	1.2	260	
MALLORY	RM8-3	1.3	100 ma.	1.1 1.2	2.7 HRS. —	MERCURIC OXIDE CELL
MALLORY	RM82-4	1.3	100 ma.	1.1 1.2	6 HRS. 45 MIN.	MERCURIC OXIDE CELL
EVEREADY "AA" TWO CELLS	1016E	1.61	125 ma.	1.2	77	CONNECTED IN PARALLEL
RAY-O-VAC "C"	1-LP	1.60	125 ma.	1.2	112	
MALLORY	RM82-4	1.3	125 ma.	1.1	4 HRS.	
M.WARD PENCELL	-	1.66	220 ma.	1.1	47	2 IN PARALLEL
FIRESTONE "D"	T-C-1	1.7	220 ma.	1.1	192	
EVEREADY "D"	950	1.6	260 ma.	1.2	155	
VITAMITE	-	2.2	300 ma.	1.4	150	
BRIGHT STAR "C"	F-11	3.2	500 ma.	2	42	2 PHOTO FLASH CELLS; IN SERIES
BURGESS	TE	1.67	1 AMP.	1.2	32	HEARING AID
BURGESS	TE	3.4	1 AMP.	2	40	2 CELLS IN SERIES
EVEREADY EVEREADY (2 EACH)	412-E OR 412	48	1.25 ma. 1.5 ma. 1.8 ma.	41	14 HRS. 10 HRS. 6 HRS.	2 BATTERIES IN SERIES
EVEREADY EVEREADY BURGESS (2 EACH)	420-P OR 420-E OR K15-E	48	1.25 ma. 1.5 ma. 2 ma. 3 ma. 4 ma. 5 ma.	41	130 HRS. 96 HRS. 75 HRS. 42 HRS. 25 HRS. 10 HRS.	2 BATTERIES IN SERIES
EVEREADY BURGESS BURGESS	455-P OR XX30E OR XX15E	48 48 24	1.3 ma. 1.8 ma. 2.5 ma. 3 ma. 6 ma. 7 ma.	41	345 HRS. 240 HRS. 155 HRS. 135 HRS. 75 HRS. 46 HRS.	XX15E IS HALF SIZE OF XX30E

BATTERY CHART

"A" & "B" BATTERIES

MAKE & NUMBER	VOLTAGE	SIZE	WEIGHT	ILLUSTRATION OR REMARKS
* ANY PEN-CELL	1½ V.	9/16" DIA. × 2"	⅘ OZ.	"A"
EVEREADY 1016-E	1½ V.	19/32" × 1 3/64" × 2 1/16"	1⅗ OZ.	2 PENLIGHT CELLS IN WRAPPER
* ANY SIZE "C" CELL	1½ V.	1" DIA. × 2"	1⅘ OZ.	"B"
EVEREADY 1040 / BURGESS "CL" †	1½ V.	1" DIA. × 2 25/32"	2⅗ OZ.	ALSO AVAILABLE WITH PLUG-IN CONTACTS
BURGESS "TE" / EVEREADY 1462-P †	1½ V.	1⅕" DIA. × 3 15/16"	3⅘ OZ.	"E"-PLUG-IN CONTACTS
* ANY SIZE "D" CELL	1½ V.	1 5/16" DIA. × 2 13/64"	3⅗ OZ.	
• BURGESS U-10-E / EVEREADY 411-E †	15 V.	19/32" × 1" × 1 13/32"	1 OZ.	FLAT CONTACTS
• BURGESS K-10-E / EVEREADY 417-E †	15 V.	1⅛" × 31/32" × 1 9/16"	1⅗ OZ.	FLAT CONTACTS EVEREADY AVBL. IN PLUG-IN
• BURGESS U-15-E / EVEREADY 412-E †	22½ V.	19/32" × 1" × 2"	1⅘ OZ.	"C"-FLAT CONTACTS
• BURGESS K-15-E / EVEREADY 420-E †	22½ V.	1⅛" × 31/32" × 2 3/16"	2⅗ OZ.	"D"-FLAT CONTACTS EVEREADY AVBL. IN PLUG-IN
BURGESS XX15E	22½ V.	13/16" × 1 1/32" × 3 ⅝"	4 OZ.	"G"-PLUG-IN CONTACTS
EVEREADY 433P	33 V.	1" × 2 5/16" × 3 1/16"	6⅗ OZ.	PLUG-IN CONTACTS
BURGESS XX22E	33 V.	31/32" × 2 5/32" × 3 ⅛"	6⅘ OZ.	PLUG-IN CONTACTS
BURGESS XX30	45 V.	31/32" × 2 7/16" × 3 9/16"	7⅗ OZ.	SNAP-ON CONTACTS
BURGESS XX30E	45 V.	31/32" × 2 5/16" × 4 ⅛"	7⅗ OZ.	"F"-PLUG-IN CONTACTS
EVEREADY 455-P	45 V.	1" × 2 5/32" × 3 25/32"	8⅘ OZ.	"F"-PLUG-IN CONTACTS
BURGESS XX45	67½ V.	1 5/32" × 2 5/16" × 3 ⅛"	11⅗ OZ.	SNAP-ON CONTACTS
EVEREADY 467	67½ V.	1 ⅛" × 2 ⅝" × 3 45/64"	12 OZ.	SNAP-ON CONTACTS
SPECIAL BATTERIES				
BURGESS 2Z2SC	3 V.	1 5/16" × 1 5/16" × 2 ⅜"	3⅘ OZ.	SC-SPRING CLIPS
BURGESS 2Z2PI	3 V.	1 5/16" × 1 5/16" × 2 13/32"	3⅗ OZ.	PLUG-IN CONTACTS
BURGESS B2	3 V.	29/32" × 1 5/32" × 2 ⅞"	3⅗ OZ.	
BRIGHT STAR	3 V.			PLUG-IN CONTACTS
MALLORY RM8-3	1.3 V.	1" DIA. × 19/32" HIGH	1 OZ.	"I"-MERCURIC OXIDE STEEL CASE
MALLORY RM82-4	1.3 V.	1⅛" DIA. × 5/8" HIGH	1⅘ OZ.	"J"-MERCURIC OXIDE STEEL CASE
VITAMITE	2.2 V.	⅞" × 1" × 1 5/16"	1 OZ.	"H"-WET CELL

* MAY NOT BE READILY AVAILABLE AT ALL DEALERS.
† DIMENSIONS MAY VARY ± 1/64" ACCORDING TO MANUFACTURER.
• DIMENSIONS MAY VARY SLIGHTLY ACCORDING TO MANUFACTURER. MAXIMUM VOLTAGE OF FRESH BATTERIES MAY VARY UP TO 8-10% OVER GIVEN RATING.

'47 NATIONALS IN PICTURES

This pictorial story augments our previous coverage to give those modelers who couldn't attend in 1947 a better idea of the Nationals

Don McGovern and his nifty mobile weather bureau

R. P. Baumgardner launches class B original

G. Perryman testing his flying scale entry

Class C giant held by owner Dave Reber

Adjustments by F. Parmentir and C. F. Wasser

Contestants at work in one corner of repair shop

Los Angeles *Thermal Thumbers* team won club trophy

Three Chicago boys make repairs near their tent

Chicagoans Summit and Ruzic, with Ran Ring at right

John Clemens gases up at the stunt plane pits

Davis presents Duromatic stunt trophy to Tucker

Bill Tenney helps two contestants start a jet

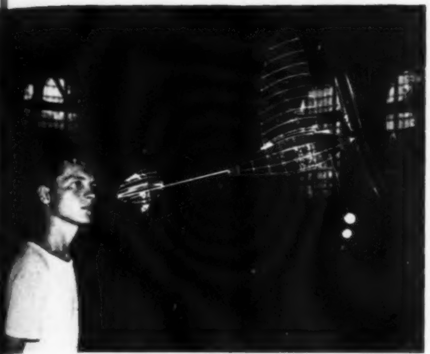
The team from Winnipeg with some of their ships

Indoor contestants Motley and Baumgardner

Jim (Man from Mars) Walker

Cabin model of Jack Clemens

Bob Holland with Jasco trophy



Microfilm cabin job is flown by Don Miller

Joe Boyle launches "C" ship

J. Meckall repairs his motor

Merrick Andrews with trophies

Wally Wallick starts motor assisted by Bob Thomas

Bob Thor of Minneapolis stops to change prop

Win Davis launches Siegfrieds R. C. plane

Davey Slagle and his team (Mom & Pop Slagle)
W. Leske discusses crackup with fellow modelers

"Happy" Blink with his beautiful B-26 control liner
Wally Blake mournfully picks up the pieces

Joe Sweet and M. Koebernick work on their jets
Phil Shaw, Bill Thilnes and Bob Hemberger

V HEAD

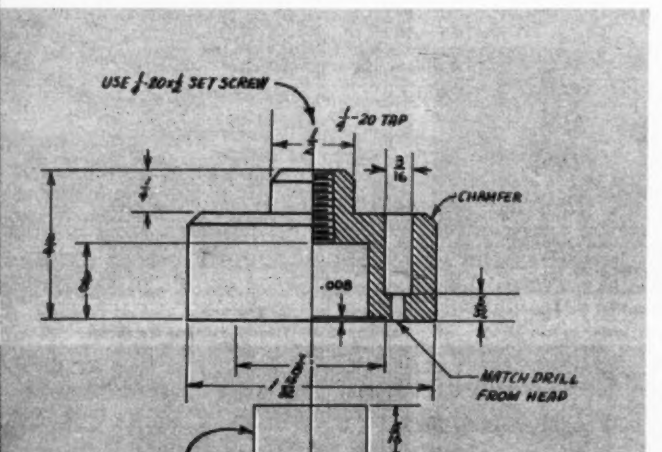
Most any diesel can be fitted with this variable head tried originally on a Drone

by JACK BAYHA

YOU'VE probably listened to all sorts of fancy claims for both fixed and variable compression diesel engines. By the time you've heard all the pros and cons you are probably at a complete loss as to what type engine you want. We decided to prove once and for all which was best. The answer was rather an odd one—*both* are best. Suppose we explain.

The variable compression diesel has the advantage of running on a number of different fuels, while the fixed head job is rather limited to the fuel its compression ratio is set for. The fixed head motor is usually easier to run since there is only one adjustment to make. We decided what we really wanted was an engine which was either fixed or variable compression. With a few simple machining operations this became a possibility.

The head was first developed for a *Drone* but the design features can be incorporated to make any other fixed head diesel a variable. The design shown served as a basis for the new *Drone* variable compression head being made by the engine manufacturer. Our "V" head incorporates several features which might be explained, before we tell you how to make one for yourself.



The mere adding of a contra-piston to the head of an engine is not sufficient. A way must be found to assure a positive seal so that the head will not leak. The tiny shallow recess at the base of the head is the whole trick of preventing this leakage. Its outside diameter is just sufficient to clear the gasket under the head, and it thus supports the side of the gasket and prevents it from blowing.

Naturally we do not wish to alter the engine itself, as we want to be able to put that fixed head back on at a moment's notice; so with the foolproof head seal we use the original screws to hold the head down.

The original "V" head was made with only a lathe and a drill press, the latter can easily be replaced with a hand drill if need be. The head is made from aluminum bar stock which is readily obtainable, any type being suitable. The plug, or contra-piston may also be of aluminum, although brass or steel will probably give better service. Actually, little wear may be expected since the piston in the engine does all the work, the contra-piston moving up and down only when you adjust it.

The machining operations are too obvious to require detailed explanation. We suggest the head be made first, the hole in the center being bored out so as to clear the engine piston with only a slight amount of clearance. Then the plug should be machined to fit the bored head. This is also a machined fit; no grinding or lapping is necessary. Clearances which can easily be machined are quite adequate since the oil in the fuel soon closes up any small gaps which might exist between the contra-piston and the head bore. Naturally, don't make the fit excessively sloppy; just allow a nice comfortable clearance.

When the head machining is completed, the holes should be drilled. Here a special method must be used; the head which is originally supplied with the engine serves as a drill jig. The contra-piston is removed and the original head is held against the bottom of the "V" head. The boss on the bottom of the stock head serves as a guide to assure accurate alignment when drilling.

Once the holes are drilled the head is complete except for an adjusting screw. This should be an Allen Set Screw, which has a hexagonal recess in its head. When you procure the screw be sure also to obtain a wrench to fit it. The wrench is used only when adjusting and is removed once the engine is adjusted.

The original head was tested at the Drone factory, where heads were merely pulled off new engines and the "V" head substituted. This new head ran excellently on every engine with which it was tried.

(*Turn to page* 60)

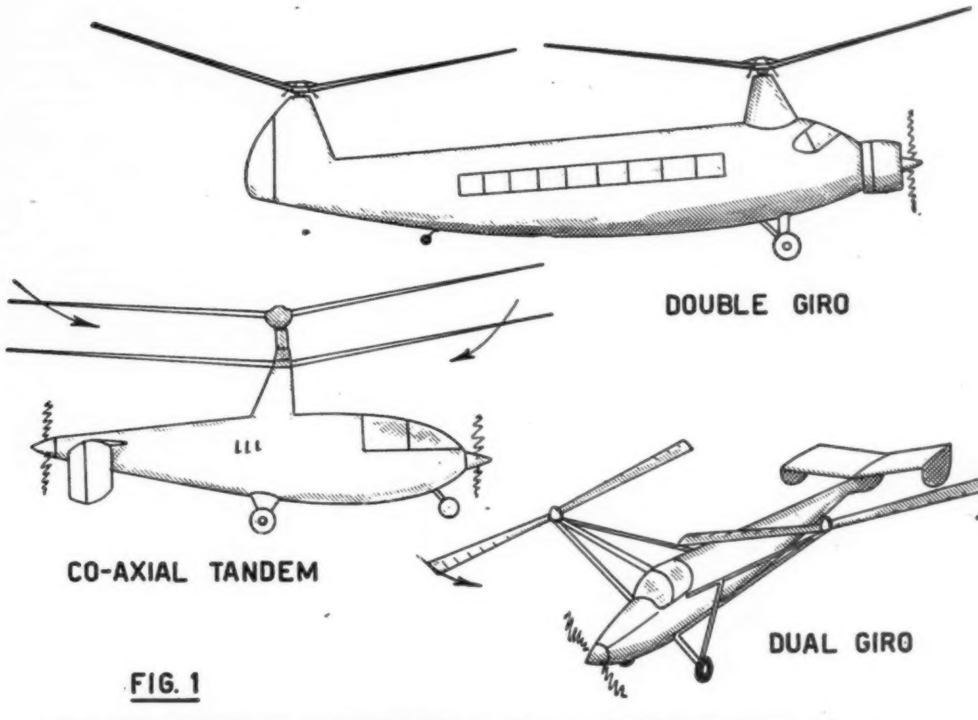


FIG. 1

AUTOGIRO THEORY

Flying model autogiros is interesting if you know the tricks of stability

by ROY L. CLOUGH JR.

THE flying model autogiro offers all the desirable characteristics of steep climb, good duration and crash-proof landings —provided it is "right!" But to get any model "right," the basic theory upon which it operates must be well understood. Therefore, let us start at the beginning.

What is an autogiro?

By definition, "autogiro" means "self rotating." The autogiro is a flying machine that is supported by a series of wings gliding about an axis which is attached to the machine. Therefore, the relative wind over the lifting surfaces is divorced to a large extent from the relative wind of forward motion of the machine as a whole, permitting a wide range of speed and nearly vertical takeoff and descent.

It should be pointed out before proceeding that the autogiro, although it bears a superficial resemblance to the helicopter, has very little in common with direct-lift aircraft. The *helicopter* is a machine with a lifting air-screw connected to its powerplant; the *autogiro* is a machine with a rotating wing which is *not* connected to the engine, and in which force arrangements are more nearly like those of conventional rigid wing airplanes. (The auxiliary shaft used for jump takeoff in full scale autogiros does not apply since it is strictly a "starting" device.)

It is, however, quite incorrect to think of the autogiro as a machine in which no power is transmitted to the rotor, despite the fact that there is no mechanical connection. The reason for this will be explained shortly.

Since it belongs in the airplane category, the performance of the autogiro is similar to that of rigid wing craft, but with extended performances in the low speed register. Thus many common acrobatics, which could not be done with a helicopter, can be accomplished with an autogiro—for example, loops and Immelman turns.

There are several possible design layouts for autogiros, but the single engine, single propeller machine is the most common. Other types shown in Fig. 1 of dual rotor configuration have been proposed from time to time. These types have very little to recommend them since there is no need for counter-rotation. Indeed, cycling lift and torque effects, far from being problems are highly desirable things to work with.

Another type of autogiro is shown in Fig. 2.. The writer has built several successful models along this pattern. In this variation of the auto-rotational principle, two laterally mounted rotors spin about

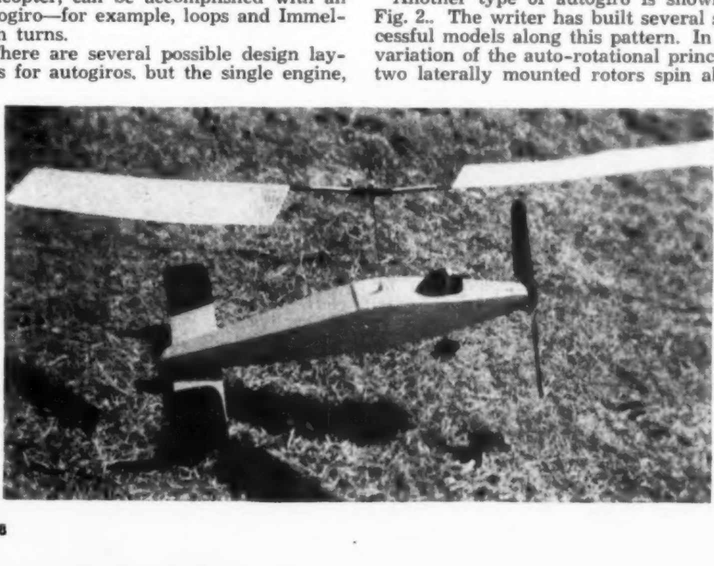


FIG. 2

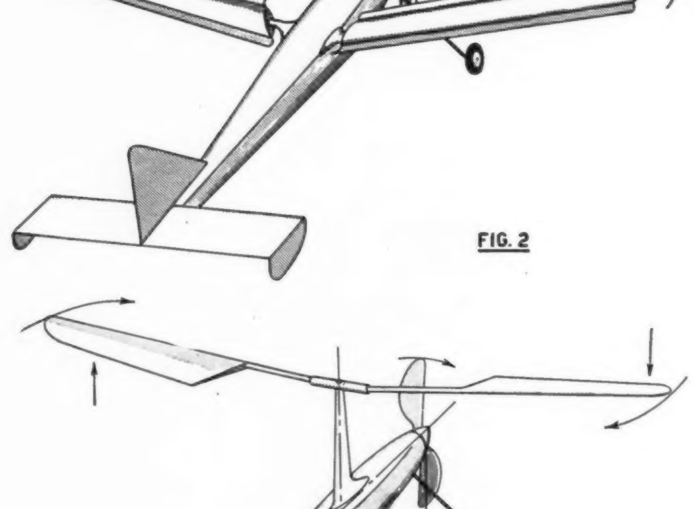


FIG. 3

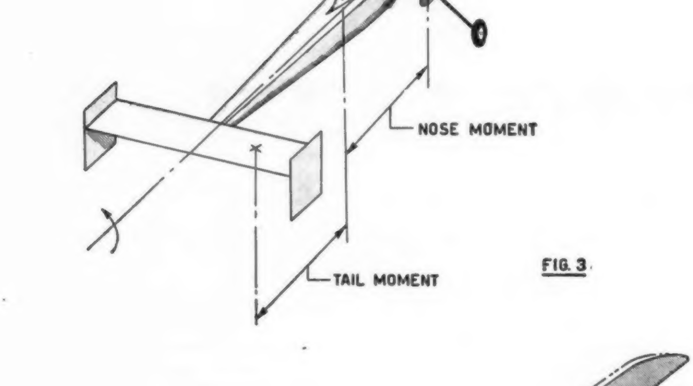


FIG. 4

a horizontal axis to provide lift. Gyroscopic forces are less noticeable and articulation does not seem to be necessary with this type, but drag appears a bit higher than in the conventional vertical axis giro. This autogiro variation, by the way, should not be confused with the Flettner rotor principle or the Cyclogiro.

Before attempting to design a flying model it is essential to understand just what takes place when an autogiro is in flight. In Fig. 3 we see a diagram of significant forces. First of all, since this is a powered model, there is torque reaction which tends to roll the ship to the left about its longitudinal axis. Second is cycling lift, which operates similar to the cycling lift experienced by the rotor of a helicopter in forward flight. Thus the advancing blade produces more lift than the retreating blade because of the differential of relative wind encountered by each.

Because of this cycling lift effect the advancing blade of the rotor must be on the torque side (the left in this case). The reason for this is not difficult to understand. As the advancing blade moves forward torque reaction tends to depress it, thus increasing the air pressure upon that blade. Because of its articulated design increased air pressure increases the speed of the blade and it produces more lift. Thus torque effect damps itself out in the properly designed giro by transmitting some of the engine effort to the lifting rotor in a roundabout way. (This is why we said earlier it is incorrect to think of an autogiro as a machine in which no power is transmitted to the rotor.) Since the blade on the right hand side is retreating it can never lift as much as the advancing blade and we do not have to worry about it.*

Under certain conditions the rotor can be made to revolve in the opposite manner from that which is specified, but this comes under the heading of "tricked up." If the builder remembers the rule: Right hand prop, left hand rotor and vice versa; he will find it possible to design flying models which will perform well with no tail off-sets of any kind and with fin, horizontal stabilizer and thrust line arranged the same as for any ship in which the lifting surface is placed well above the center of gravity.

To design any model a starting point is needed. The two most common starting points are estimated weight and maximum dimension. Since we are discussing rubber models it is easier to start with maximum dimension, the rotor diameter, because weights will fall into line of themselves if conventional construction methods are employed.

The following co-efficients were worked out by the writer and have been found to be capable of guiding the design of a stable model autogiro. They are not intended to be the last word but are safe middleground for the experimenter to start out from.

Decide upon the diameter of the rotor, then find the area the disk will cover when rotating. Call these two figures D (diameter) and A (disk area) and proceed as follows: The total rotor blade area is obtained by multiplying A x .067. Divide the result into two figures since a two bladed rotor is recommended. Because the blades should not be extended inward along the rotor spar for more than 86% of the radius, this will dictate a fairly low aspect ratio.

The minimum area of the stabilizer will be .027A, and the fin surface .0185A, best divided between two fins.

Next find the tail moment by multiplying the diameter of the disk by .30. The nose moment should not exceed .22D (moments are determined from the rotor axis aft to the geometric center of the stabilizer and from the rotor axis forward to the centerline of the propeller). The tail moment co-efficient can be increased, but the nose should not be. In any case the total length of the fuselage should not exceed .61D in order to preserve good mass distribution.

The diameter of the propeller should not exceed .29D since a larger diameter may introduce disproportionate gyro effects in turns. (This will, of course, depend upon the mass of the propeller and the rotor; we are assuming normal construction.)

Thus, by using these figures we find that an autogiro model with a 28" rotor has a blade area of 44 sq. in., a stabilizer

(Turn to page 74)

*IMPORTANT NOTE: This applies to powered models only. A towline or "kite" giro will tilt downward on the advancing side because here the drag is greater.

WEST COAST TIPS

by JOHNNY DAVIS

CONTEST activity in these "hyar parts" has been at a maximum and we will try to give you the gist of it.

The Anaheim *Balsa Butchers* finally had their contest, September 27, as reported last month, and we are here to tell you that we never saw a better run meet or a more beautiful place to have one. Twice a year city authorities turn a deaf ear to those busybodies always complaining about the noise, and throw open the gates to one of the most beautifully kept baseball diamonds in the country for a slam-bang model meet. Marvin Crawford, manager of the local model shop, is the mainstay of the contest committee. We are familiar with Marv's competence in such matters, having known him when he was instructor in model airplane building at the Santa Ana Airbase during the war. He really does things up "brown" and this year's meet was no exception.

The September 27 meet was not A.M.A. sanctioned, due we understand to the meet having been rained out on September 20. For this reason attendance was not as high as anticipated. However, all who came enjoyed themselves.

The biggest feature of the day was the duel between Keith Storey of Pasadena and Ed Sharp of Long Beach. When the smoke cleared away, Keith had first in Class B and C, while Ed had first in A. Between the two of them, however, they accounted for all three classes in first and second places, which to our knowledge is the first time this ever happened.

In all fairness to Keith, however, we must report that he was trying to break Les MacBrayer's record of 120.8 mph for Class III and waited too long each time to time in. He was clocked several times for four laps at around 122 mph; but for the contest rules he had to fly eight laps in Class A and was never able to get his clocking right for eight.

Incidentally, Les MacBrayer was right in there too, but his little *McCoy 29* ship is just a wee bit fast for him to handle. His controls were stuck slightly at Anaheim, and when he took off he couldn't get his ship down close to the ground. It was going so fast at the top that Les had to leave the pylon and just stand and spend all his time flying it. It sure looked funny sitting right up at the top of the circle buzzing like a little bee. His little ship is really hot anyhow, and until Les flew it so fast back at the East-West meet he had never been over 110 mph. He was so dizzy back at St. Louis after the flight that he had to let himself down to the ground hand over hand on the pylon.

Don Gulotta, Ed Lansberg, Bobby Brown, Jack Gilroy, Bud Jamison and Bob Palmer seem to be the fellows to beat in Precision these days. They are getting so good that in order to judge their maneuvers it takes special judges and pro-rated grading systems.

Practically all precision contests are flown under the So. Calif. Model Congress rules nowadays, and these rules are very clear on all maneuvers and points for grading. (We published these rules in our September 1947 issue.)

* *

We hate to leap on somebody when they are down, but what has happened to the Los Angeles Aeromodelers? They had a contest Sunday October 5, and everybody showed up as it was to be an A.M.A. sponsored meet. However, imagine everyone's surprise when it was announced that "someone" had forgotten to get an A.M.A. sanction. That seems awful funny, especially since Ray Acord, A.M.A. vice-president for this area, is the "wheel" of the L.A.A.M.

Donal Hogan, owner of Donal's Hobby Shop in El Paso, Tex. (in wheel chair), is shown flying in a Precision event, assisted by Frank Abel, left, and an unidentified friend

Anyway, what started out to be a fine Class AA contest turned out to be a "Sunday" flying session. Most of the boys put away their beautiful jobs, not wanting to take a chance on wrecking them just for the sake of a trophy. Those who did fly had to combat the normal afternoon breeze that gently carries away anvils and large boulders.

The Los Angeles Aero Modelers will really have to have a good meet next time if they want the boys there.

* *

Ah, San Diego! Land where the tall "saftig" grows and grows. Saftig, dear friends, is not the name of a new kind of safety gadget, nor is it a particularly nauseous brand of breakfast cereal. It is simply the name of a tall gent, Jim Saftig, and

(*Continued on page* 36)

Herbert A. Sturtevant of Glendale with two of his controlliners. The *Bat Wing* is powered by a *Super Cyclone*, while two Ohlsson 60's pull the Martin B-26

West Coast Tips

(Continued from page 34)

a sadder expression you have never seen on anything's face short of Frankenstein. Hello, Buddy!!

Some years back, we had occasion to meet Mr. Saftig while in the midst of a steaming race plane meet. At that meet, he flew everybody's airplane from San Diego, including his own. Since there were quite a few entries from San Diego and each had three tries for a time, Mr. Saftig spent almost an entire afternoon in the center of the various circles. Understand now, this was before the advent of the pylon and Mr. Saftig is about 7 ft. tall—or at least looks that big when he is leaning backwards against a little speed plane.

Well, Mr. Saftig flew and flew, and as he had to report to the timer's desk where we were seated each time he flew, by the end of the contest we felt as if we had known him most of our life. Because of his definite ability to fly, and the added advantage of such extreme "leverage," he was in great demand as a speed pilot. From talking with his "fans" we found out that he runs the San Diego Model Shop, and that at the drop of a control handle he would close up and go flying.

What brought all this up in the first place is that we were going to praise the San Diego *Airliners* meet which is so ably put on each year about this time by our friend "Scotty" Scott, in conjunction with the San Diego *Journal* and the City Recreation Department. This is one of Southern California's best meets of the year, and always draws about ten thousand spectators, as well as the best modelers for miles around. They always have the best trophies, too.

This year was no exception. The weather was perfect. The meet ran to precision flying more than speed, however, as the precision boys just overflowed all over the place. Don Gulotta, the Snafu Boys and Jack Gilroy all cleaned up, as did Ed Sharp in the Speed events. Ed and his pilot, Don Newberger, managed to take all first places in A, B and C Speed with Ed's new design all-metal speed ship. Incidentally, he plans to put the ships on the market soon and is dickering with several companies for manufacturing rights.

Big moment of the meet was when Don Newberger flew Ed's *Dooling 61* job 138.004 mph for a new Class VI A.M.A. Open record. Heartbreaker came a few moments later when Keith Storey flew his *McCoy 60* ship (rumored to be the "new" 60 which will be released soon) 135.33 mph to also break the existing world's record in Class VI. However, since Ed's ship had already gone 138-plus, Keith had to be satisfied with second.

(Incidentally, George S. Oliver, secretary of the *San Diego Airliners*, has offered to send all data on how their meets are run to any club in the country, so here's his address: 2921 Monroe St., San Diego 4, Calif.)

Following are the results:

Jr. "A" Speed: Paul Conrad, 99:06, K & B Torpedo
Jr. "B" Speed: Ray Benskin, 109.75, McCoy 49
Al Wadleigh, 98.41, McCoy 49
Jr. "C" Speed: Ray Benskin, 111.80, McCoy 60
Al Wadleigh, 105.88, Dooling
Sr. "A" Speed: Ed Sharp and Don Newberger, 113.20, K & B Torpedo
Les McBrayer, 107.84, McCoy 29
Ed & Joe Haulik, 104.10, McCoy 29
Sr. "B" Speed: Ed Sharp and Don Newberger, 123.71, McCoy 49
Eddie Haulik, 100.11, McCoy 49
M. L. Burkam, 83.48, McCoy 49
Sr. "C" Speed: Ed Sharp and Don Newberger, 138.004, Dooling
Keith Storey, 135.33, McCoy 60
Babe Dunning, 127.02, Dooling
Jr. Stunt: Jack Gilroy—Orwick
Jim Malbeck—Cyclone
Gary Smith—Cyclone
Sr. Stunt: Don Gulotta—Orwick
Ed Lansberg—Orwick
Bob Palmer—Orwick
Flying Scale: Walter Jackman—Navion—Vivel
Bucky Monroe—Spad—Torpedo
Dustin Carter—Beechcraft—Atwood
Team Stunt: 1. Jack Gilroy, Don Gulotta, Ed Abacherle.
2. Bud Jamison, Bob Brown.
Novelty: Don Gulotta, Fred Burchett, Eugene Remund.
Women's Division: Bunny Baldree, Beverly Sappington.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Model Airplane NEWSLETTER

"TO FOSTER scientific advancement of model aviation," the first annual model technical conference was held at the Chamberlin Hotel, Fort Monroe, Old Point Comfort, Va., last October 4. The session was sponsored by *Brain Busters* model club of Hampton, Va., with the active support of the Academy of Model Aeronautics. Actually, the conference was a continuance of pre-war scientific meetings.

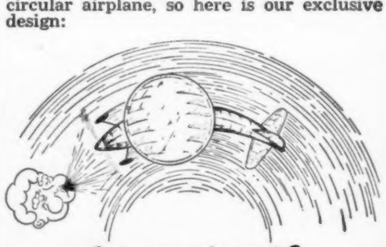
Among those who spoke or presented papers were W. Hewitt Phillips, head of NACA (National Advisory Committee for Aeronautics, the government's aviation testing labs) Stability and Control Section, who discussed ways and means of designing more efficient models; Dr. Walter A. Good, Chairman of AMA contest board, who presented data on the best climbing angle of gas models; Frank Zaic, aeromodeling author and experimental flyer, who spoke of recent research in the field of flying wing gliders; John P. Campbell, section head of NACA's Free Flight Tunnel, who presented data compiled from actual flight tests of pylon gas models in a 12 foot tunnel. Conference chairman was C. A. "Tom" Hulcher, head of NACA's Pilotless Aircraft Research Section and the first model airplane maker ever hired by NACA.

For those who take their model aerodynamics seriously, the *Brain Busters* recorded all material on magnetic tape, and a complete transcription of the conference should be available soon at a nominal fee. Copies may be secured through AMA headquarters in Washington, D.C. Every club should secure at least one copy—it will make wonderful reading and provide the basis for some interesting discussions.

"Hew" Phillips' recommendations for gearing down engines and using larger props make sense; Walt Good showed how fantastic are the claims of some free flighters about 5,000 feet per minute climbing performance; Johnny Campbell and Bob Shea, his aide, seem to have exploded the old reliable "center of lateral area" theory to something smaller than atoms.

Frank Zaic in his own inimitable manner held the crowd spellbound with his description of circular air currents which act on models flying in circles. By referring back to early wind tunnel and operational tests on dirigibles, Frank found that a model (or airship) turning in a circle, as all good models should, is in effect flying in a circular airflow. Perhaps his findings will revolutionize model design—even control line craft.

Personally, we think the entire matter can be cleared up by everyone building a circular airplane, so here is our exclusive design:

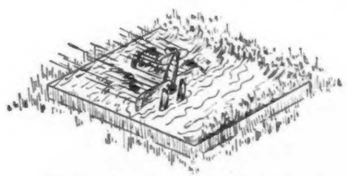


Circular Aircraft?

The day following the conference, the *Brain Busters* sponsored its 5th annual hydro championships, with contestants from 30 cities in 12 states. Top award was the Starr Truscott Memorial trophy offered each year by the Junior Chamber of Commerce in memory of the late chief of hydrodynamics for NACA. This year's winner was Paul Salake who set a new Class A open division hydro free flight gas record with an average time of 3:13. Paul also took 9th in the hydro rubber flying.

Big feature of the meet—which was held "on" Langley Field army air base—was the 50 foot square hydroplane tank that was reputed to hold 15,000 gallons of water. Regardless of the actual amount, it was a project of the first magnitude. Strips of plastic impregnated fibre glass cloth 54" wide were sewed side by side until they covered an area of over 2,500 sq. ft.! The "tank" was filled by the local fire department using a regular pumping truck.

Extremely amusing for everyone except the hapless flyer were the incidents when models just wouldn't take off and insisted on digging their noses in. Some of the larger jobs would start off bravely enough but just couldn't seem to part floats from water; then, as if saying "This is the end!" they would stub a float and dive under. Several did better as sailboats than aircraft. After "digging in," the fair Virginia breezes would waft them gently back across the tank to the waiting arms of the owners.



Sailing, Sailing.....

Unfortunately there are all too few clubs active in this country who have the spirit or backing to put on a similar hydro meet or technical meeting—let alone both! Model aviation owes a debt of gratitude to all the *Brain-Busters* who worked so hard on both projects. Splendid cooperation by the Air Force, NACA, Hampton officials, the Jaycees—to mention only a few—was most necessary. G. W. Poythress is president of the *Brain Busters;* Charles Folk, secy. John Worth handled publicity for the twin events; genial Dick Everett directed the hydro meet. As a matter of fact, the hydro tank was dubbed, "Everett's spittoon."

* *

Well, at long last we have the complete results in from the last National meet. Contest officials and headquarters staff of the American Legion deserve much credit for the professional manner in which results were compiled. It is unfortunate that mixups in the official flight times occurred; this was largely the result of inexperienced timers and recorders. Their errors threw off the final standings; every flight card had to be checked and rechecked, with the result that official compilations were in doubt for some time.

As previously published (Nov. M.A.N.), the Los Angeles whiz Frank Cummings Jr. is the new national champ and proud possessor of the Piper Cub donated by DePonti Aviation Service of Minneapolis.

As if it were not enough that a Californian should win the meet championship, the *Thermal Thumbers* club of Los Angeles copped the club championship. Team members were: champ Cummings, Bill (Motor Man) Atwood, Andy Peterson, Bill Lopez and Bob Holland. As a matter of fact it was a clean sweep across the board for the Golden Gate state.

We've compiled some statistics for you which should prove interesting. We found that 440 awards were passed out; these ranged from the full size airplane to American Legion medals. In most events prizes went down to 12th place, but where fewer entrants were registered awards stopped sooner. It averaged out to 10.1 prizes per event for the 41 different events. This included breaking down class categories (for instance, free flight gas, class A) into age divisions—junior, senior and open.

It would be interesting to know just how many entrants there were from each state and what percentage placed. However, those figures are not available. It is obvious, of course, that local flyers should capture more places by weight of sheer numbers. Yet, the small band of California flyers took more than twice as many places as modelers from Minnesota.

For Ideal XMAS GIFTS..See PAGES 73 & 79!

And considering the point system, the West Coasters did even better! This is how it works—if there were 12 prizes passed out in an event, we gave the winner 12 points; the last man 1 point. Past experience indicates this is as fair a way as possible to handle comparisons since it takes into account the number of entries in an event. Certainly it is easier to win first place against 4 entries than 12 or more! In a case of only 4 entries, we assigned the winner only 4 points.

It worked out to a total of 2,559 points for all winning entrants. California copped 23.1%! Included in the table is the average as-the-crow-flies distance travelled by each state's representatives.

State	*No. Places Won*	*Points*	*%*	*Miles Travelled*
California	81	590	23.1	1,520
Illinois	73	456	17.9	399
Minnesota	33	172	6.7	—
Michigan	28	158	6.2	475
Ohio	27	130	5.1	705
New York	16	129	5.1	988
Indiana	18	119	4.7	513
Kansas	24	94	3.7	447
Texas	16	86	3.4	1,026
Virginia	17	68	2.7	950
Washington	11	58	2.3	1,444
Missouri	10	56	2.2	447
Florida	9	55	2.2	1,102
Wisconsin	8	49	1.9	228
Nebraska	7	42	1.6	380
Massachusetts	11	36	1.4	1,140
Oklahoma	3	34	1.3	686
Pennsylvania	5	34	1.3	912
Tennessee	8	26	1.0	687
Oregon	7	25		1,482
Connecticut	4	20		1,064
New Jersey	3	19		988
South Dakota	2	18	(Less	342
Alabama	3	14	than	931
Iowa	4	14	one	228
West Virginia	3	14	per	724
Maryland	2	13	cent)	950
Arizona	1	9		1,292
Colorado	2	9		686
Louisiana	3	9		988
Canada	3	3		380

Note that 18 states did not place in the winner's column. And four states (California, Illinois, Minnesota and Michigan) amassed more than 50% of the points.

It appears that no matter from what angle you view it—places won, prizes garnered, records set—it was a big year for California's valiant crew at the Nationals!

* *

Leon Shulman of Drone Engineering Co. passes along some sad news to us. You'll remember we lauded Leon some columns back for setting a new shining example among "industry" contestants by passing up the hardware he won in meets as a professional.

However, after trying out the plan for several months and giving the go-by to more than $500 worth of merchandise and trophy awards, Leon says circumstances force him to pick up his rewards at meets where he wins. Seems as if his policy became so well known in the East that when he scored a victory contest officials skipped right over him, not only in presenting the prizes but in announcing the victors. As a result, many of his wins were never mentioned, and desirable publicity for his performance and the performance of his products just "weren't."

We feel he deserves a great deal of credit for trying to make his plan work; we're sorry to hear that contest officials crossed up his good intentions. Most of all we are discouraged to learn that other "industry" contestants laughed at his efforts and considered him silly to pass up any chance for prizes.

PHOTO CREDITS

Page		
2	Upper	Press Assoc.
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23	All	Robert C. Hare
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32	All	Peter Petrucelli

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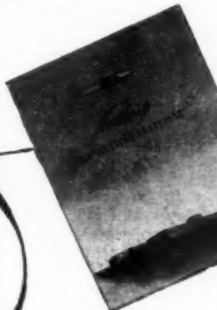

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AUTOMATIC IGNITION CUTOUT

by Ray Rusher

HAVE you ever experienced rundown batteries caused by your prop stopping in position with the ignition timer points closed? This may happen at a time when you can't get to the plane immediately to turn the ignition switch off. An *automatic ignition cutout* will eliminate the possibility of dead batteries under these conditions.

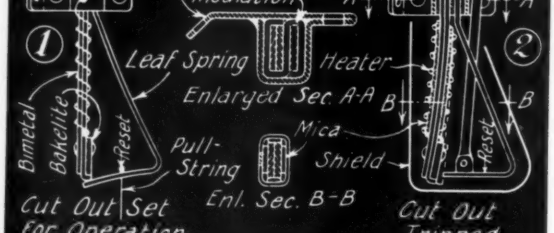
The cutout consists of a simple "warp switch" which is actuated by heat generated by continuous current flow through a heater (formed of resistance wire) in the cutout. As long as the engine is functioning, there is only intermittent flow amounting to about 25% of full flow during a timer-closed condition and the cutout switch remains closed. About 5 or 10 seconds after continuous flow starts due to the prop stopping with the timer points closed, the cutout functions to open the ignition circuit and keeps it open until such time as the cutout is manually reset.

The construction is comparatively simple, the complete cutout being shown diagrammatically in drawing 1 (below), and partly in section in drawing 2. A strip of "bimetal" and a leaf spring of steel or brass are wrapped in a strip of insulation around which a bracket of sheet tin is wrapped and one end soldered to the part of the bracket that serves as a mounting base as shown in section AA. The bimetal may be taken from an old heating pad thermostat, and the spring is bent to shape shown in drawing 2. The electric heater is a piece of No. 23 *Nichrome* wire two inches long and wound in a coil slightly larger than the crossection of the bimetal. Strips of mica are inserted between the coil and the bimetal as shown in section BB to electrically insulate one from the other. The ends of the heater are soldered to the bracket and the bimetal as indicated by white dots in drawing 1. A piece of bakelite is secured to the bimetal to provide for an open circuit when the cutout trips.

The cutout is connected in series at the solder lugs in the primary circuit of the ignition system, and when trip-out occurs the bimetal and the spring assume the warped position shown in drawing 2. As the bimetal cools, it warps back to position shown by dotted lines and is then ready for reset.

The cutout will have to be initially adjusted for about a 10 second timing on used batteries, or a 5 second timing on fresh ones. This is done by bending the leaf spring until the desired timing is secured. Timing adjustment, of course, is done with the prop in position to keep the ignition points closed so there will be continuous flow of current. The greater the degree of overlap of the contact end of the spring in relation to the outer end of the bimetal, the longer the timing period, and vice versa.

After trip-out of the cutout, it can be reset by pressing in the direction of the arrow labeled "Reset". This can be done in a number of ways, drawings 1 and 2 showing two different methods of accomplishing reset by either a pull string or a pushrod. The pushrod may be permanently connected to the spring or may be in the form of a ⅛" dowel removable through a hole in the fuselage wall. When permanently connected, it serves to show when the cutout has tripped as it will project farther from the fuselage at that time.



The cutout should be mounted in an airtight compartment of the fuselage or shielded as shown in drawing 2 against any airflow over the heater. Otherwise the cutout may be inoperative, or at least its timing slower in flight than when you initially adjusted it on the ground. The contact action can be improved by applying silver solder, or by electroplating the contacting portions of the bimetal and the leaf spring in drawing 1 with silver.

Fieseler Storch

(*Continued from page 21*)

on the plans, and cement half of each to the 1/16" x 3/32" strips. Add the additional 1/16" x 3/32" strip as indicated, remove from the plans and add the remaining formers to the opposite side. Cement the "B" former to front of the fuselage, and plank the assembly with strips of 1/16" x 1/8" balsa. When completed, this planking is sanded down to an approximate thickness of 1/32". Trim the longerons down to fair smoothly into the nose section, and cover between formers "C" and "D" with stiff cardboard.

Shape the noseblock from medium hard balsa and recess to take a small, metal-bushed hardwood thrust bearing. Cement the two circular sections cut from former "A" to the rear of the noseblock, making sure this assembly will line up properly when inserted into the nose of the model. Add the two 1/16" dowel aligning pegs and a 1/8" dowel rubber tensioner stop as indicated on the plans.

The landing gear, added after the fuselage has been covered, is composed of 1/8" x 5/16" main struts and 1/16" dowel braces. Fill in around the lower stringer with scraps of 1/16" sheet balsa at the points where these braces are cemented to the fuselage.

Lay out all wing ribs except the two base ribs on a piece of 1/32" sheet and cut

out the lightening holes first, using a bow pencil or compasses into which a small cutting tool broken from a razor blade has been inserted. Use care in selecting hard, straight grained wood and in seeing that the holes are not cut too large or too close to edges of the ribs, as this will weaken the ribs and cause buckling when the covering is applied. When all lightening holes have been made, cut the ribs to outline shape, sand to uniform section, and notch for leading edge and spars. Two base ribs and four braces are cut from 1/16" sheet.

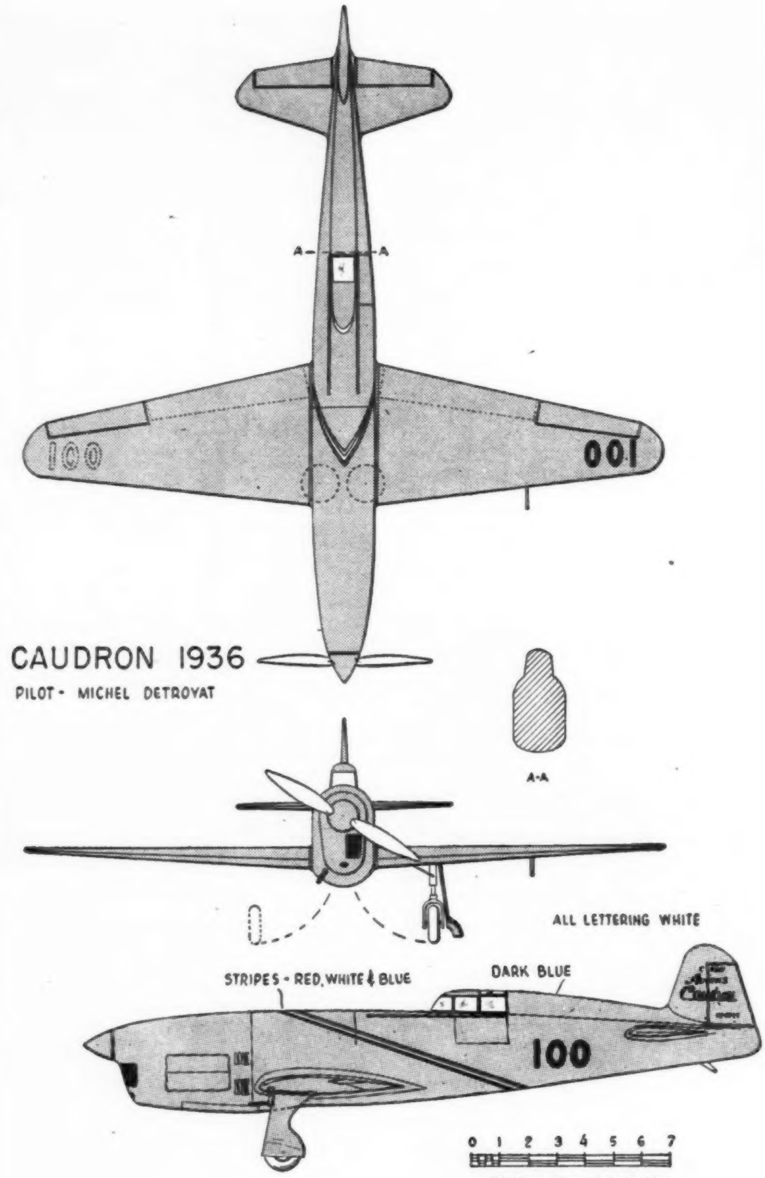
Pin the 1/16" x 3/16" rear spar and the 1/16" x 1/4" front spar in place over the wing plan view. Cement the ribs and end rib braces in place, and add the 3/32" x 3/16" trailing edge, 3/32" sq. leading edge, 3/32" sq. tip and 3/32" sheet tip formers. Fill in on the undersurface of the wing with 1/16" sheet for the wing strut plates. Remove the wing assembly from the plan, round leading edge, and tip and taper the trailing edge. To build the opposite wing half, trace and reverse the view shown. Rudder and stabilizer are constructed directly over the plans, using the sizes indicated, and the completed assemblies sanded to an approximately streamline section.

Cut the propeller from a hard balsa blank shaped to dimensions shown on the plan. Drill center of spinner and insert a section of 1/16" I.D. aluminum tubing or small brass bushing. Insert off-center tubing as shown for free wheeling engagement. One end of a length of 1/16" dia. steel wire is bent to form the motor hook. Insert the opposite end through rear of nose block and thrust bearing. Slip a ball bearing washer, prop, plain washer, light coil spring, and an additional plain washer over the end of the shaft, in order named. Bend the end of the shaft as shown to form winding hook and free wheeling engagement, making sure this part slips freely in and out of the tubing. Bend the rubber tensioner stop from 1/16" steel wire, bind to the shaft with light copper wire and solder *securely*. When there is no tension on the shaft the free wheeling should be disengaged, and the rubber tensioner stop should engage the dowel pin *only* sufficiently to prevent the shaft from turning. A short piece of neoprene tubing is slipped over the motor hook to prevent cutting of the rubber.

Cover the stabilizer first, using lightweight tissue applied with clear dope or banana liquid. Spray lightly with water and pin down over a flat surface to dry. This procedure prevents warping; it is also followed when covering rudder and wing surfaces. When the covering has dried, cut out a portion of the two rear fuselage uprights and cement the stabilizer into the slot in rear of the fuselage.

If colored tissue is used, dope 1/16" wide strips of tissue over the outside edges of the cabin members. The noseblock, struts and other parts are covered in similar manner. This method eliminates the added weight of color doping such parts, and from the standpoint of appearance is more attractive due to uniform coloring.

The completed model is given two coats of clear dope thinned 50%, and with three or four drops of castor oil added to an ounce of the dope. For power, use 8 to 10 strands of 1/8" flat rubber, 14" long, and well lubricated. For test flights put in 75 to 100 turns by hand. When the model has been properly adjusted, a winder is used.



Design Forum

(Continued from page 13)

the drag of the most modern control liners. Speeds can only be increased, we believe, by giving more attention to engine operation and propeller efficiency. These are much more important than reduction in drag because their efficiency can be increased tremendously, while drag can be reduced only slightly over that of present designs.

The room for greatest improvement lies in the propeller. There has been great speculation as to its correct design. Some have mistakenly believed that long thin blades give most efficient results. It has been the experience of the author since 1910, and of foremost control line fliers, that best results are obtained with comparatively short and stubby blades. Practice has shown that the outline in Fig. 2 gives high efficiency. Incidentally, this is a "left hand" propeller, for pushers.

This discussion is inspired by a letter and sketch submitted by Paul Lipps. He asks us to criticize his newly-designed control line model, giving us a sketch with no specifications regarding the propeller or installation, the latter governing to some extent the efficient operation of the engine. In other words, he apparently believes that the proportions and outline of his airplane are the chief factors governing speed. Obviously we cannot give a worthwhile analysis because he says nothing about the most important factors: propeller design and engine installation. He does show a cowl around the engine, which unquestionably will reduce the drag. However, even if the drag is reduced 15% or 20%, as much as 40% of the thrust can be lost by improper propeller design. The V tail which he shows unquestionably will reduce the

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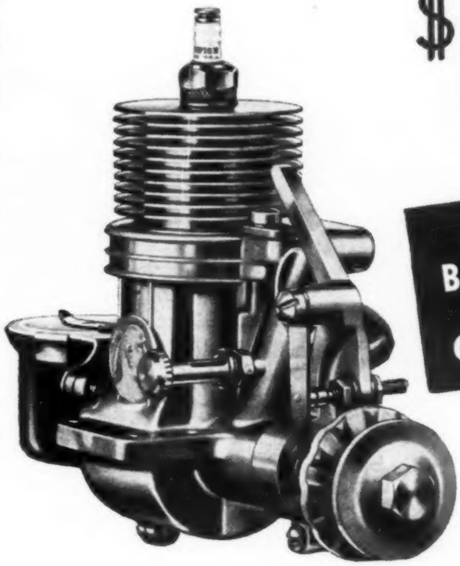

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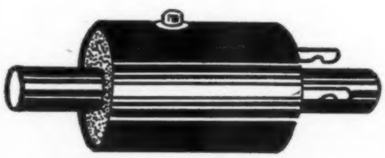

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drag because fewer surfaces are grouped together where they join the fuselage. This decreases turbulence and interference. However, we believe his plane will be critical in respect to directional stability because the lateral projected area of the stabilizer is very small and, therefore, will have little fin effect. We believe the two stabilizer halves should be tilted up at an angle of at least 30° on each side.

Control line fliers who believe they are obtaining maximum propeller and engine efficiency may reduce the wing drag to some extent by designing their wing with a planform shown in Fig. 4, and by giving consideration to wingtip design. Wingtips often seem to be unimportant, but tip whorls created by poorly designed wingtips can create as much resistance as all the rest of the wing. Wingtips can be improved greatly over those used at present, the whole idea being to create smooth flow from the tips without turbulence. We suggest that control liners try out wingtips shaped as shown in Figs. 4 and 7. Tips formed in this manner may be quite blunt without being inefficient. In fact, square wings with tips shaped in this manner have proven most efficient, some as much as elliptic wings with carefully rounded tips.

The wingtip design shown in Figs. 4 and 7 did not result from mere theory. It resulted by accident. Several planes were constructed in this manner for structural reasons. The undersurface being flat, it was found that this was bent upward more readily, and formed a neater wingtip edge than would result from attempting to bend down the upper cambered surface. This is true especially where sheet balsa is used for covering. In flight however this tip showed its worth; all planes using it proved to be excellent soarers. Naturally, some attempt to explain its efficiency resulted. From our observations we believe that the upward inclined undersurface allows the air pressing beneath the wing to shoot *outward* and rearward from the tip at considerable speed so that it does not curl up and over the uppersurface abruptly, as in the case of wings with square tips or even normal rounded tips. Fig. 6 illustrates the action of the air spilling out from a normal wingtip and creating a wingtip whorl that extends rearward. Apparently, the air pressure beneath the wing shoots the air out of the tip at a more abrupt angle than the wing with the tip shown in Fig. 4. Fig. 7 illustrates the airflow resulting from the wingtip in Fig. 4.

Instead of creating extreme pressure beneath the wing at the tip and forcing out the air at an abrupt angle, the upward slanting under wing surface allows the air to be released so that very little pressure is created at the tip. Because of this, the sideward thrust that forces the air outward is small and the flow travels rearward with only a slight sideways displacement. In this way the force which induces the whirling motion of the air is reduced, and though the air may rotate to some extent this rotating action is comparatively insignificant. Possibly some readers may have another or better explanation for the action of this type of wingtip, but we recommend they try this design on some of their latest control liners.

Another form of wingtip which may give excellent results appears in Fig. 5. It resembles a bird's wingtip. Soaring birds have feathers which are extended parallel to the wingspan when in flight.

These are arranged so that slots are formed between each one, and through their action tip whorls are eliminated. However, some birds extend the tips of their wings rearward in the manner shown in Fig. 5. We believe the rotary motion of the air at the tips is reduced by pulling back the tip into a point, as shown, especially if the undersurface is slanted up, as indicated in Figs. 4 and 7.

It is difficult to get mathematical or quantitative results unless these wing forms are tested in the wind tunnel. However, comparative results can be obtained by trying one form of wing or another on the same airplane under like conditions. Experiments like this are bound to be interesting, and often as much pleasure results as from actually winning a speed contest. It is especially appealing to those with the instinct of the pioneer and explorer, because by trying out these new ideas in this manner you are actually exploring the field of science.

* *

Paul Michel Audette of St. Lambert, P. Q., Canada sends us an interesting sketch of a jet airplane, Fig. 8A. Its general design shows considerable imagination and its wing arrangement resembles some of the latest experimental high-speed aircraft. In order to reduce the effect of air compressibility encountered at and near the speed of sound (752 m.p.h.), wings with sweptback leading edges are being used. The idea is to knife through the air rather than pound through it with a straight laterally extending wing leading edge. This is based on the assumption that a pointed object will pierce a solid or semi-solid object more readily than one with a straight edge. This is reasonable and, so far, experimental results have justified this contention. During the war the Germans carried on intensive experiments with this type of leading edge and found that the pounding of the air due to compressibility was reduced. Also, designs for high-speed aircraft were submitted to the U. S. Army with sharply sweptback leading edges.

Some engineers contend that this feature greatly reduces wing efficiency. We believe their opinion is based on the fact that they assume we mean sweptback wings when we say sweptback *leading edges*. Sweptback wings unquestionably are much less efficient than straight wings. We believe this results chiefly from the fact that the trailing edges are sweptback and not necessarily the leading edges. Mr. Audette's design shows sweptback wings with sweptback trailing edges. In this type of plane the airflow close to the center of the wing is released prematurely. This may be the explanation for the inefficiency of the sweptback wing.

We do know definitely that wings which approach a circular planform have very high lift coefficients. It is reasonable to expect, therefore, that a wing with trailing edges extending straight across from each wingtip, as in Fig. 8B, will therefore give higher lift coefficients than the normal sweptback wing in Fig. 8A, or at least the total drag of the airplane relative to weight of the structure involved will be less with the triangular form of wing in Fig. 8B than with the sweptback wing in Fig. 8A. Recent experiments seem to uphold this view, although this conception should not be considered as final. Possibly this may provide an interesting experimental program for control line fliers who are research-minded. The fuselage similar to the one in Fig. 8A, but with a propeller instead of a jet, may be used in combination with various types of wings. It should not be difficult to determine which wing form gives best results. Of course, this will be at comparatively slow speeds and Reynolds numbers. Nevertheless, results may indicate the trend, if not absolute values.

We are puzzled to know why Mr. Audette has swept back the leading edges of the rear wing, in Fig. 8A, and has neglected to include this feature in the design of the small forward wing. If a straight leading edge creates pounding at sonic speeds and sweptback leading edges reduce it, then we have a reduction on the rear wing but a pounding on the front wing. This might well create directional instability and yawing tendencies at sonic speeds. We believe that better results would be obtained by either sweeping back the leading edges of the front wing in a manner similar to the rear wing, or by eliminating the front wing entirely and modifying the rear wing to create a tailless airplane. This is readily accomplished by turning up the wing trailing edges at the tips so that the resulting angle of incidence at the tips is several degrees less than at the wing root where it joins the fuselage.

Another feature which might improve the design, especially if the wing form in Fig. 8B is used, is a wingtip with rounded leading edge and sharp trailing edge. Where the leading edge joins the body it might be swept forward in a graceful curve so that changes in pressure at the leading edge would not be abrupt at any one point, but would be graduated and thereby provide an even

NOTES ON THE WAKEFIELD

Now is the time to design and build your WAKEFIELD contender if you are interested in the premier rubber power event. It seems certain that 1948 will see a resumption of this class. BILL WINTER gives you the dope on design and construction so you can produce a winner . . . in the February issue of MODEL AIRPLANE NEWS—on sale everywhere Jan. 9th!

flow over the wing. Only recently a tailless airplane similar in design to Fig. 8B, without the front wing, was flown with great success. The wing leading edges were swept back 60°. Trailing edges were nearly straight, sweeping rearward at the tips. All who saw this plane, including experts, believed it would fail to leave the ground. However, it not only left the ground but was much more steady in flight than planes of orthodox design, and its speed was unusual. Those who are tired of flying the same old crates with orthodox fuselage and wings can inject a little interest in their flying by trying out some of these new designs.

* *

We hope some of our readers will send in neatly made sketches or drawings of their latest creations so they may be discussed in this column and so that model builders may see what you are doing. Send to: "Design Forum," % MODEL AIRPLANE NEWS, 551-5th Ave., New York 17, N. Y.

Hoopla

(*Continued from page 9*)

Cut two lengths of aluminum tubing and mount as shown for the flight timer and dethermalizer timer string guides; also cut a short length for a gas drain which is mounted at the front. Make two plywood inserts with wire hooks and mount as shown. These are to hold the power unit in place. Drill one 1/8" hole as shown on firewall drawing and insert a length of dowel in the fuselage so it extends 1/8" from the fuselage. This and the three engine bolts serve as guides for the power unit and will hold it in a fixed position. Make the two wing hooks from 1/16" wire and cement in place. Coat the inside of the fuselage front section several times with clear dope so that the fuselage will not become oil soaked.

The stabilizer platform, which is also the dethermalizing unit, is now made and installed as shown in detail. Be sure to cement all wire parts very well. Operation of the dethermalizer will be explained later. The stabilizer and rudder templates are shown full size. They may be assembled on your work board with the ribs equally spaced, as shown on drawing. The sub-rudder is made of 1/16" plywood and covered with 1/16" sheet balsa, sanded to shape and cemented in place.

Cut the wing ribs and tip outlines from a good grade of medium hard balsa. Make the wing in two sections and assemble when finished. Start by laying the leading and trailing edges in place, following the dimensions on drawing. The leading edge will have to be blocked up to insure correct airfoil. Then cement the ribs in place and slide the spars in one at a time. Do not cement the tip section spars or the tip section leading and trailing edges to the centersection until the proper dihedral has been checked. When the two sections of the wing are finished they will be joined as shown on the drawings. Care should be taken that the spars do not crack when the two sections are joined. Also check for alignment before cementing. Cover the centersection as shown with 1/32" sheet balsa and sand well.

The original model was covered with red silk, but Silkspan or heavy tissue will do for the covering. To insure a good tight covering give the model several coats of dope, as over 50% of the model's strength is in the covering.

The firewall is cut from 1/8" aircraft plywood and drilled as shown to mount an *Ohlsson 23* or *19*. Any other type of engine may be used by making small aluminum motor mounts. If you use an *Ohlsson* engine, remove the three bolts and put the heads at the rear for easy assembly of the power track, landing gear and engine.

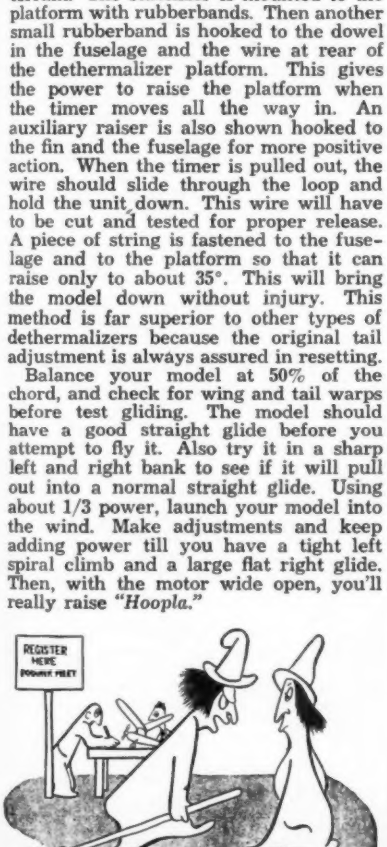
The ignition track is made as shown, and will have to be fitted so it will have a very snug fit when finished, as this reduces breakage of the unit and fuselage in the event of a crash.

For mounting the landing gear, take three pieces of sheet aluminum and bend around the gear so that each engine bolt will hold one in place. Care should be taken that these brackets are all of the same thickness or they will offset the engine.

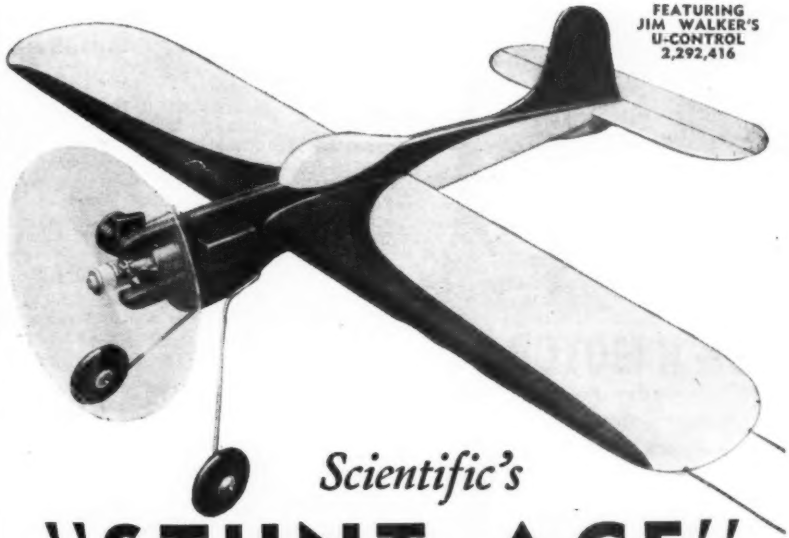
For final assembly of the power unit proceed as follows: place a 1/8" inside diameter washer on two of the engine bolts. Insert these through the two wire fastening brackets of the ignition unit and then through the firewall. The third and top bolt is connected to the ground wire and inserted through the firewall. Now mount the landing gear with its three brackets on the three engine bolts, making sure the gear is in proper position. Install your engine and front cover, putting the condenser on the top bolt as shown on the drawings.

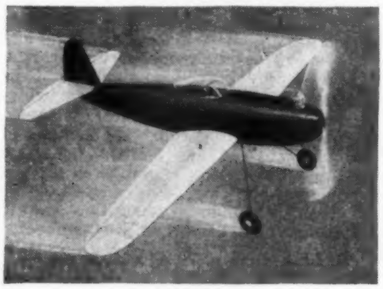
The dethermalizer timer should be set for about ten minutes, more or less time depending on the flying conditions and terrain. The stabilizer is mounted to the platform with rubberbands. Then another small rubberband is hooked to the dowel in the fuselage and the wire at rear of the dethermalizer platform. This gives the power to raise the platform when the timer moves all the way in. An auxiliary raiser is also shown hooked to the fin and the fuselage for more positive action. When the timer is pulled out, the wire should slide through the loop and hold the unit down. This wire will have to be cut and tested for proper release. A piece of string is fastened to the fuselage and to the platform so that it can raise only to about 35°. This will bring the model down without injury. This method is far superior to other types of dethermalizers because the original tail adjustment is always assured in resetting.

Balance your model at 50% of the chord, and check for wing and tail warps before test gliding. The model should have a good straight glide before you attempt to fly it. Also try it in a sharp left and right bank to see if it will pull out into a normal straight glide. Using about 1/3 power, launch your model into the wind. Make adjustments and keep adding power till you have a tight left spiral climb and a large flat right glide. Then, with the motor wide open, you'll really raise *"Hoopla."*



"He mumbled something about cross-section rules and turned me down."





Model Motors for 1948

(Continued from page 18)

forged dural connecting rod. Two "slipper-type" rings are fitted to the cast aluminum alloy piston which has a domed head for high turbulence combustion and low turbulence scavenging of the charge. Heat treated steel is the material used for the crankshaft, and the crankpin is especially designed for the roller bearing. The crankshaft is supported on two ball bearings and ground with a 10 degree taper at the outer end to take a flywheel or propeller adapter.

Like certain other engines designed especially for racing, the *Dooling* has a cast aluminum alloy cylinder with a honed alloy iron liner. The crankcase and cylinder are cast integrally, and the aluminum alloy cylinder head is attached with eight bolts. A compression ratio of 9 to 1 is used and the stroke is less than 3/4 of the bore. The disk-type aluminum alloy rotary valve has a heat treated shaft cast in place and a large port opening. The carburetor, which is held to the case with a setscrew, has a 3/8 in. diameter throat with the outlet streamlined for a minimum pressure drop. The by-pass channel is machined for uniformity. Without the slightest intention of disparaging a product which appears to be of outstanding design, it must be stated that the maximum output figure of 1-1/2 hp at 15,500 rpm claimed by the manufacturer for the *Dooling* engine is so exceptionally high that it is open to doubt and calls for further test verification.

Forster Brothers has presented brake hp curves for the improved *Forster 99*, which indicate that the maximum output operating on an alcohol and castor mixture is .69 hp at 7,800 rpm, and operating on gasoline and mineral oil .62 hp at 7,000 rpm. This engine is particularly suited for radio controlled planes and has a "two-speed" timer. There are two separate contact points, one for low speed and one for high speed. By switching the current from one contact point to the other the engine responds to the predetermined setting. For single point ignition with manual operation the high-speed contact point only is connected.

High compression cylinder heads now are being supplied as extra equipment for the *Super Champion*, compression ratio 8.00 to 1; *K. & B. Torpedo*, ratio 8.20 to 1; and *K. & B. 24*, ratio 8.50 to 1. A compression ratio of 12.50 to 1, which is standard for the *Orr*, is the highest found in the table, and *Hornet* is second with a ratio of 12.00 to 1.

An examination of one of the latest *Orr 65* racing engines reveals excellent workmanship and good appearance. The important design features of this engine, which include a ball bearing rotary disk valve, were described in a past article, but it is hoped some information about its performance can be furnished in the near future.

An innovation found in the recently introduced *Mohawk Class B* is a bakelite tank mounted on the crankcase which permits the use of "hot" fuels. Weight of the engine with tank is 7 oz. It is a rotary valve type with a deep finned steel cylinder, hardened steel piston, and aluminum alloy rod.

Other spark-ignition two-cycle engines recently brought out, the specifications of which are listed in the tables, include the *Scout Twin 60*, the *Genie, Judco Class B*, and a .24 cu. in. *K. & B.* model.

Several new makes of compression-ignition engines have been placed on the market. One recent offering is the *Air-O Diesel*, produced by the manufacturer of the *Air-O Mighty Midget*. It is a Class B engine operated on a mixture of 7 parts ether, 6 parts castor oil, and 4 parts kerosene. It has a hardened and ground compression adjusting plug or counter piston. This is adjusted to provide low compression for starting and high compression for full power by means of an Allen type setscrew and a wrench. It functions in a manner similar to that of the spark advance on a gasoline engine. The manufacturer claims this provides a distinct advantage over the use of a fixed compression ratio because an engine of this size with the compression ratio set for

TABLE 3. PULSE-JET ENGINE DATA

	Thrust, Lbs.	Cycles per Sec.	Overall Length, In.	Maximum Diameter, In.	Weight, Oz.	Fuel	Materials
Minijet	2+	210–230	28½	2	16	Gasoline	Venturi, Carburetor, Head and Shield, Die Cast Alum. Alloy; Nose Faring, Blade Keeper, and Body Assembly Nuts, Brass; Tail Pipe, Inconel.
Dyna-Jet	3½	280–300	21¼	2½	16	Gasoline	Combustion Tube, Stainless Steel; Valve Head and Retainer, Alum. Alloy; Metering Jet, Brass; Flow-jector, Steel, Heat Treated.

TABLE No. 4
Analysis of Construction Data
(Two-Cycle, Spark-Ignition Engines)

	No. Engines
CYLINDER	
Steel	31
Aluminum Alloy	24
Iron	4
Magnesium Alloy	1
Not Stated	1
Int. with Crankcase	9
Att. to Crankcase	52
Head Integral	18
Head Attached	43
CRANKCASE	
Aluminum Alloy	54
Magnesium Alloy	2
Special Alloy	2
Iron	1
Not Stated	2
PISTON	
Iron and Steel	42
Aluminum Alloy	16
Not Stated	3
CONNECTING ROD	
Aluminum Alloy	45
Steel	8
Bronze	4
Magnesium Alloy	2
Special Alloy	2

	No. Engines
CRANKPIN BEARING	
Bushed	31
Not Bushed	25
Roller	1
Not Stated	4
WRISTPIN BEARING	
Not Bushed	47
Bushed	10
Not Stated	4
CRANKSHAFT BEARING	
Bushed	35
Ball	16
Not Bushed	5
Not Stated	5
Ball Thrust	7
CYLINDER PORTS	
Two	31
Three	16
Four	4
Not Stated	10
ROTARY VALVE	
Shaft-Type	25
Disk-Type	13
Dual	1
Type Not Stated	3
Total Rot. Valve	42

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Buccaneer (C)	6.95
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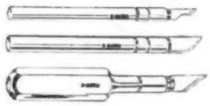

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SEE PAGE 73

easy starting cannot approach the maximum power and rpm obtainable with a high compression. Rated at 1/5 hp at 6,500 rpm, the *Air-O Diesel* is said to be capable of developing over 1/4 hp at maximum speed. It weighs only 7 oz. including the fuel tank. The cylinder including fins is machined from steel bar stock, and the heat-treated alloy steel piston is centerless ground and lap fitted. A chrome molly steel rod is used and the crankshaft main bearing is bronze-bushed. It is a three-port engine with a crankcase die cast from aluminum alloy. For free flight a 12" diameter 6" pitch propeller is recommended; and for U-control one of 11" diameter and 10" pitch.

Super Motors Inc., manufacturer of the well known *DeLong* gasoline engine which has won many contests, has entered the diesel field with a .29 cu. in. variable compression engine having a shaft-type rotary valve. It is operated on a fuel mixture of 5 parts ether, 4 parts mineral oil, and one part naphtha. An 11" dia. 8" pitch propeller is recommended. The steel cylinder is threaded at the lower end and screwed into the die cast crankcase. The steel piston is lap-fitted to the cylinder. Other features of the engine are an aluminum alloy connecting rod with a bronze bushing at the lower end, and a bronze-bushed crankshaft bearing. The engine has a stroke-bore ratio of .90 to 1 and is designed for beam mounting. It weighs 11 oz.

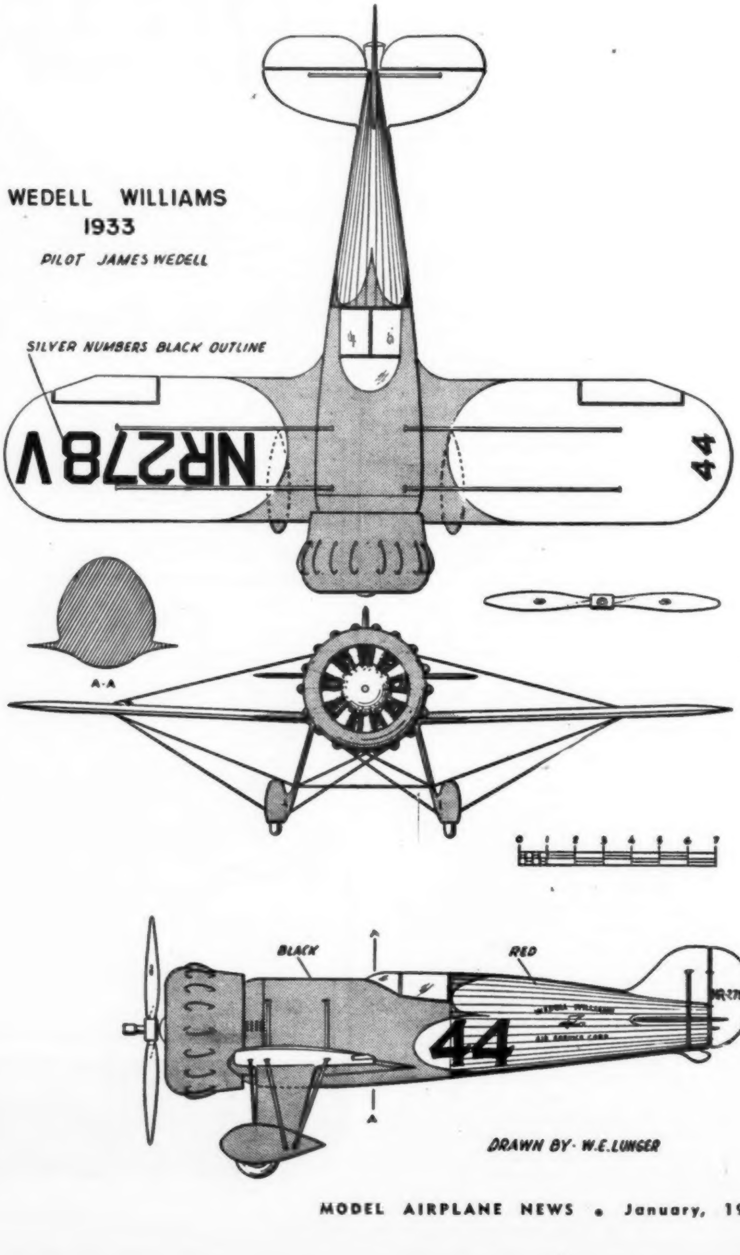
A unique feature of the Class B *Speed Demon Diesel*, placed on the market by Eastern Model Engineering Co. after about a year of experimental and design work, is the method of varying the compression. What may be termed the outer cylinder is of aluminum alloy with an integral head. Within this unit is a steel sleeve, into the upper end of which is pressed a cap. The latter unit is the true combustion chamber. The compression ratio is changed by movement of the inner sleeve unit up and down through the provision of an adjusting screw which engages with the cap and projects through the aluminum head where a lever is attached for turning it. It is stated the clearance between the sleeve and outer cylinder is held to less than .0005 in., and as the surfaces are lubricated no leakage can occur. Another distinctive feature is the provision of a separate engine mounting plate which does away with the necessity of replacing the whole crankcase when the mount is damaged. All main engine components are machined from solid stock, and oilite rod and main bearings are used. The engine is operated on 4 parts S.A.E. 30 oil, 4 parts ether, and 2 parts steam distilled wood turpentine. It is stated a Mercury plane in which a *Speed Demon* was installed showed good performance and a steady climb despite the fact this model aircraft has a 6 ft. wingspan and is designed for Class C engines.

The *Burgess M-5* four-cycle radial engine is essentially a scaled down model of the 85 hp LeBlond Series 5D five-cylinder aircraft engine, although there are some design modifications found necessary to simplify the construction. Like the LeBlond, it has overhead valves operated by push-rods. These valves have a diameter of 1/4 in. and a lift of 3/32 in. The crankcase is used as a part of the intake system, the intake tubes being run from there to the cylinders, and the two-jet carburetor with throttle connected to the crankcase. This design permits the working parts to be lubricated by mixing oil with the gasoline as in two-cycle en-

gines. The cylinders are aluminum alloy with steel liners. The connecting rods, pistons and crankcase also are die cast from aluminum alloy. An oilite bearing is provided at the lower end of the master rod. Ball bearings support the alloy steel crankshaft. The cam drive shaft, which is part of the gear case assembly, pilots into the end of the crankshaft from where it is driven. A single cam operates both intake and exhaust valves and the ignition timer is operated through reduction gearing. The cylinders have a .632 in. bore and .600 in. stroke which makes the total piston displacement .94 cu. in. The engine is rated at 1/2 hp at 3,500 rpm, weighs 22 oz., and has an over-all diameter of 5-3/8 in. It is probably the most complicated design of model engine that has ever been built on a production basis and should meet the requirements of those who desire to build realistic scale model planes; but from the standpoint of power to weight it does not compare favorably with model single-cylinder two-cycle engines of the high efficiency type.

Among the more unusual types of power units there have been several new developments. It is understood that *Dyna-Jet* will produce a more powerful pulse jet engine, similar in most respects to the standard model but guaranteed to provide a minimum of 4-1/2 lbs. static thrust. No other details were released.

A new CO2 engine, the *Campus A-100*, was recently announced. This tiny powerplant has a bore and stroke of 1/8", and engine with CO2 tank and prop together weigh only 1/4 oz. The tank is attached directly to the engine and is rechargeable from a standard CO2 cartridge fastened in a special holder. A propeller of 4" diameter and 2" pitch is recommended, and the engine is designed to fly models up to 18" wingspan, weighing up to 1-1/4 oz. The over-all height is 1", total length 2-7/8", and the tank is 5/16" diameter.



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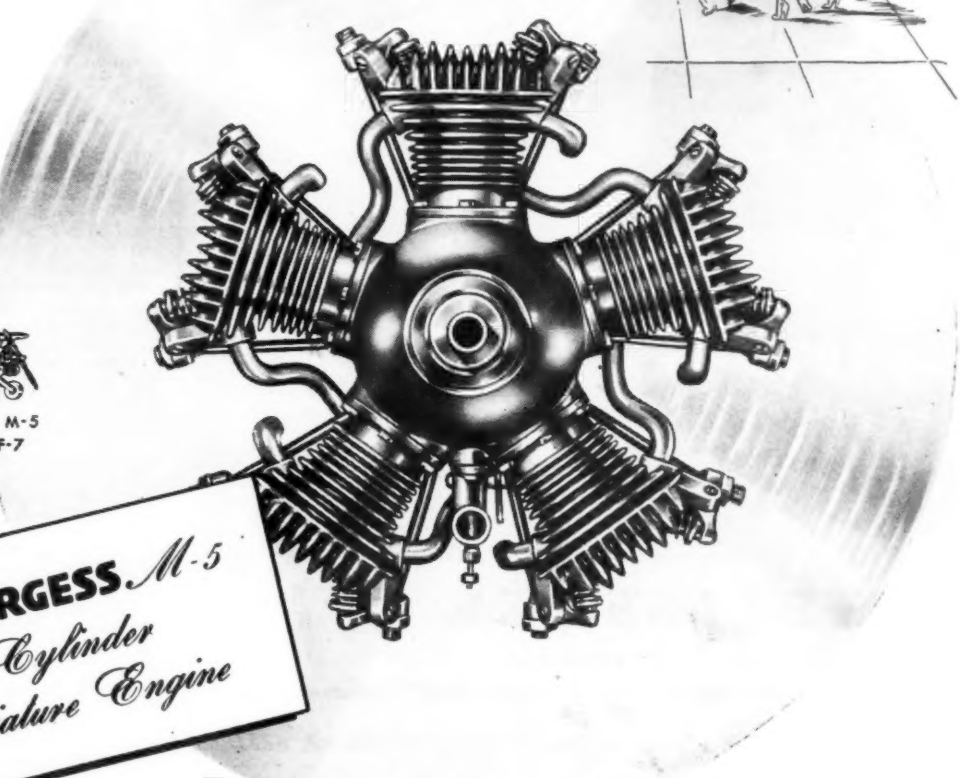

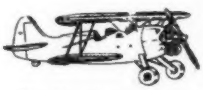

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World War I

(Continued from page 23)

the old maxim "don't put all your eggs in one basket," chose one of the competition runner-ups, the Pfalz D.XII, for alternate production. And as the summer of 1918 wore on, the wisdom of this move became more and more apparent, for it seemed that fewer and fewer D.VIIs were reaching the Front.

Pfalz D.XII Background

Products of Pfalz Flugzeugwerke always were first-class but somehow never the best. Perhaps it was because in the Everbusch Brothers' operation (See Pfalz D.III article, M. A. N. June 1944) closer attention was paid to niceties of design than was common with other manufacturers.

The Pfalz D.XII was designed late in 1917 as a high performance single seat pursuit. Economy of construction was a prime requisite in view of Germany's increasing shortage of strategic materials, and the airplane was built largely of wood at a time when metal fabrication was coming into the picture. All possible tricks and shortcuts in manufacture were incorporated in the design to make it as simple as possible compatible with high performance and strength. All control surfaces, for instance were balanced. Ailerons were smaller in area in proportion to total wing area than in earlier types. The D.XII's designers took advantage of the then recently discovered fact that a high aspect ratio aileron was more efficient than the low A type.

Fuselage of the D.XII utilized plywood skin, formers and stringer structural members closely following the method in the firm's D.III pursuit. The radiator, located in the D.XII's nose, was a characteristic of English water-cooled designs. German water cooling radiators were almost exclusively located in the wings.

Where Fokker decided, in his D.VII, that the drag of a thick cantilever wing would be less than conventional wire interplane bracing, designers of the D.XII, for economy's sake, took the conservative view and used a thin low drag airfoil and trussed the wings with necessary struts and wires.

Better Than Nothing

Pilots of the Imperial Air Service on every Front were expecting new airplanes daily during 1918. The much publicized Fokker D.VII was the apple of their eyes, and it seemed strange to the Kaiser's air officers that the ships should be continually delayed in delivery. True, many squadrons got the D.VIIs, but they were principally those opposed by American and French fighting groups. The aerial strength the Germans had not banked on coming from across the Atlantic was beginning to make its weight felt.

Lesser German squadrons—particularly those Bavarian groups operating against the English—were denied the D.VIIs, supplied with Pfalz D.XII's. The Bavarian groups, in particular, felt as though they were being treated like poor relatives since they were required to fly such old "crocks" as Albatros D.III, Roland D.III, and Pfalz D.III fighters until about August 1918. And when they were given the Pfalz D.XII around the first of September, they felt that insult had been added to injury. Unlike the Fokker D.VII, the D.XII had never been publicized and the receiving squadrons, in most instances, had never heard of the ship!

They accepted the D.XII under protest. They considered it better than nothing, had little faith in its ability. Mechanics grumbled at the multitude of interplane bracing wires which had to be re-rigged after each flight. The D.XIIs gave little confidence to pilots when they took delivery on them at supply parks and likened the ship, with all its wires and struts, to a harp.

Flight Characteristics

Pilots at first tried to find as many faults as possible with the D.XII. They still wanted the Fokker. But after a few flights they got used to the Pfalz, found that it was a little more tiring to fly than a D.VII but could keep pace with it at any altitude. In fact, they found that the D.XII could dive even faster than the D.VII.

They also found that the D.XII's rate of roll, due to the efficiency of its ailerons, was excellent even through a stall. They found the elevators equally effective at all speeds but that the rudder was sluggish at speeds approaching the stall.

They found the D.XII a stable airplane, easy to fly and that it required little attention when cruising. Pilots' main objection was the fact that the D.XII responded only to force in a dogfight and made fighting a tiring thing, especially at high altitudes.

When fitted with a Mercedes 160 hp engine, the D.XII showed a top speed of 121 mph at sea level, climbed to 3300 ft. in 2-1/2 minutes, and 16,400 ft. in 28 min. Its ceiling was 19,000 ft.

Installing the Mercedes 180 hp high compression engine with altitude control in later models helped performance somewhat. Top speed with this engine was 127 mph at sea level, its time of climb to 3300 ft. was cut to 2 min., with only 21 min. required to reach 16,400 ft. Ceiling with the more powerful engine was boosted to 21,500 ft.

In either case, the D.XII landed easily at 48 mph and quickly rolled to a stop. Because of the inadequacy of rudder control at low speeds landings were often sloppy, but the landing gear was so designed and located that the ship leveled out and stuck pretty well no matter what the pilot did. Pilots used those sensitive ailerons to keep wings level, the gear did the rest!

Taxying was difficult if much more than a breeze were blowing because of the sluggish rudder effect. On taking off, the D.XII accelerated quickly and with a violent tendency to swing to the left if the throttle were opened too quickly; but the ship got off the ground quickly after a very short run. Its climbing angle was unusually high, and best climbing speed about 65 mph. The combination of high angle and low speed made the D.XII appear to be almost hanging on its prop, ready to stall out.

Wing Construction

During the summer of 1938 the author supplied technical information and took part in the reconstruction of an actual Pfalz D.XII for motion picture work. The original airplane—20 years old at the time—was of course unairworthy, but metal parts and fuselage bulkheads were salvaged and used in the rebuilt machine. The reconstructed D.XII flew exceedingly well and was nearly 100 pounds lighter than a W.W. I example because better materials were used than were available to the Germans in 1918. Performance, too, was a bit higher than official figures on the original product.

The Pfalz D.XII was a two bay biplane in which the upper wing was built in one piece and the lower wing made in right and left panels. As in the Pfalz D.III, the lower panels attached to fairings built integrally with the fuselage. Both wings had a chord of 4 ft 7-1/2 in. and carried the same airfoil section. Upper wingspan was 29 ft. 6 in. including aileron balance overhang, while the lower wing spanned 26 ft. 4 in. Total wing area was 240.8 sq. ft.

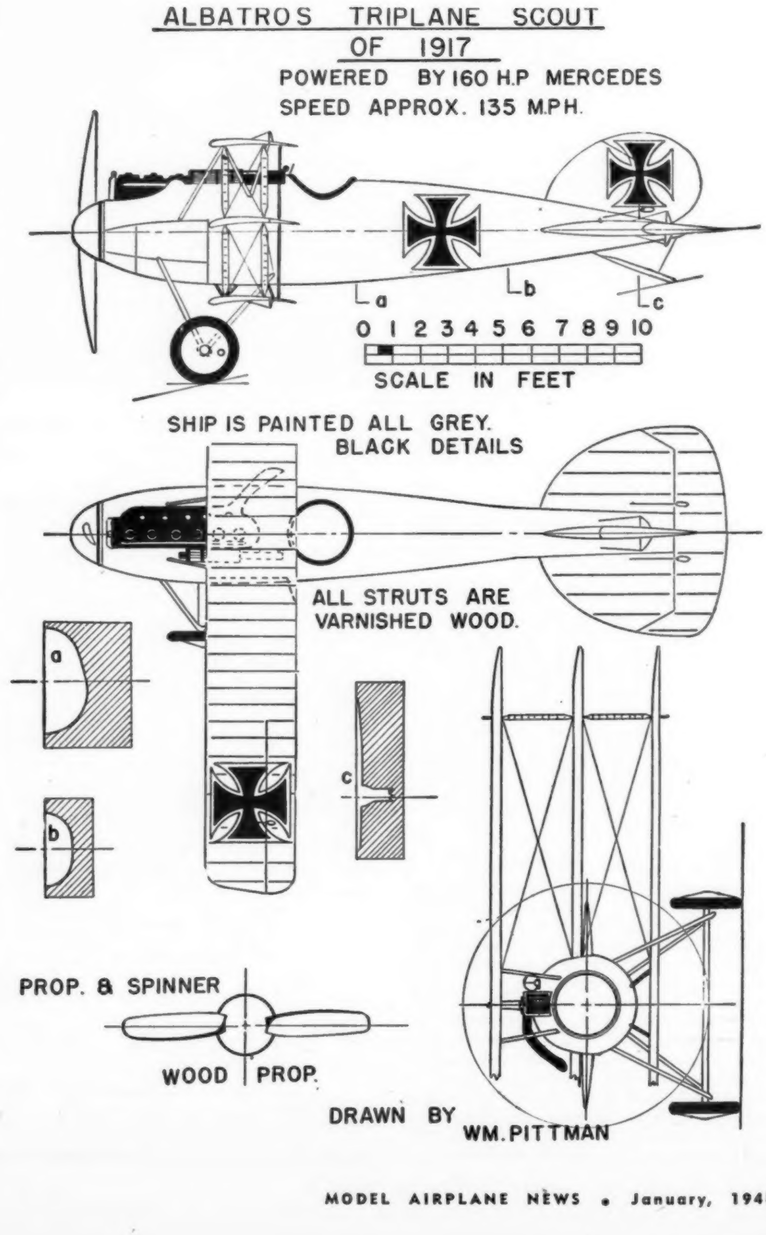
Construction of upper and lower wings was identical. Each lower panel contained 11 ribs, spaced about 13-1/2 in. apart. The upper wing contained 27 ribs. Leading edge was a slightly spindled strip of wood and the trailing edge was wire. Rib webs were die-cut from 2mm. 3-ply wood with capstrips tacked in place. Lightening holes cut in the rib webs also permitted traverse of internal bracing.

Front and rear spars of each wing were correspondingly identical. They were of the box type with vertical plywood webs. Spars were hollow except for blocks of wood inserted at points where metal fittings were attached. An auxiliary spar of solid wood, running between the rear spar and the trailing edge served to strengthen the thin airfoil at that point, but was stressed to carry the aileron hinges. Norway Pine was the principal wood used in 1918 wing structures.

To preserve the thin airfoil section, three stripes of wood—false ribs—were inserted between each full rib, on the upper surface only. All were attached to the leading edge, and the outer two terminated at the front spar. The central false rib strip was carried back and tacked to the auxiliary spar mentioned above.

Finally, the wings were internally braced, the upper plane with twelve and each lower panel with five steel tube compression members in addition to steel tie rods varying from 5mm. to 12-gauge piano wire.

Next month, this analysis of the Pfalz D.XII will be concluded.



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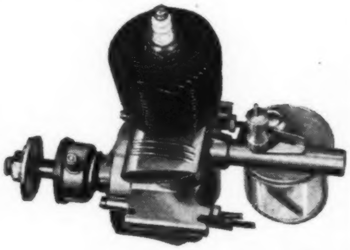

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V Head

(*Continued from page* 32)

No special operating instructions are needed to use this head; the engine is run in the regular manner, with no consideration given the fact that it is now a variable and not a fixed diesel. When using any different fuel mixture, the compression should first be lowered by raising the contra-piston. The latter is then lowered, increasing the compression to a point where the fuel will fire in the engine. Once started, the engine is brought to peak performance by either raising or possibly by lowering the compression ratio to obtain maximum power. Recent tests show it is possible to obtain a substantial increase in RPM by proper adjustment.

Care should be exercised never to run the contra-piston so far down as to allow it to hit the engine piston because serious damage to the motor may result. This new head development will give you added hours of flying time since you can now use most any type of diesel fuel in your engine, yet when you want the convenience of fixed compression, just swap heads and you're in business. The original "V" head was the result of months of sport flying, when we wished we might borrow someone else's fuel after we ran out. Well, watch out for us now—the old excuse of "it won't run your motor" doesn't hold water any more. "Say, let me have that fuel can a minute, Walt."

Plane on the Cover

(*Continued from page* 15)

First problem was the airfoil, one designed to attain critical Mach numbers higher than previously used; this produced basic data on thickness, aspect ratio, planform and airfoil shape. Another was tail design data to accommodate the stability changes in these new wings at high speed. Third, was the optimum installation of the jet engines.

As a result of this program, an entirely new family of high speed airfoils was developed, new tail design criteria were developed, and the famous "multiple" system of jet engine installation was developed. In this latter, wind tunnel tests proved that joining two and three engines into single nacelles provided lower drag and more propulsive efficiency than individual nacelles could provide. As a result, the North American XB-45, Convair XB-46 and Martin XB-48 were produced following this data.

But Boeing engineers balked! Why, they asked, confine this new bomber program to conventional aircraft with jet engines installed? Why not move right ahead into swept wings, taking two jumps instead of one, as originally planned? With their historic interest in pioneering, Boeing quietly but firmly withdrew from the program and struck out on its own. They had the Edmund T. Allen Memorial wind tunnel laboratory, some of the finest engineers in the country, and 30 years of "know-how" in the airplane design and production game.

Why sweepback? Both theoretical analysis and wind tunnel tests have revealed that sweeping back the planform of a wing reduces the compressibility effects of high speed flight. It is easy to see why this is so. Research has indicated that only the airflow normal (at right angles) to the leading edge of a wing affects the pressure distribution over the surface. Since it is the pressure distribution that determines the lift and drag of an airfoil, it is obvious that changes in this pressure distribution created by the

compressibility of air flowing over it lie at the root of trans-sonic difficulties.

In other words, looking straight down on a swept wing, we have air flowing directly back and a component of this flow turning inboard towards the leading edge, along a rib for example. Since the cosine of an angle is always less than one, it follows that multiplying the airspeed by the cosine of the angle of sweepback gives a figure *less* than the airspeed. Therefore, the speed of the air flowing over a sweptback wing is less than that flowing over a straight wing, figuratively speaking. For example, if an airplane is flying at 785 mph, the effective flow normal to the wing leading edge swept 30° is only 0.866 times 785, or 680 mph. If you examine these figures closely you will notice that 785 mph is supersonic speed (760 mph at sea level) whereas 680 mph is subsonic speed. This, then, tells the story: with sweptback wings it is possible for the *airplane* to be flying at supersonic speed while its *wings* are figuratively flying at subsonic speed!

But sweeping the wing back introduces a lot of new problems all their own. For example, it places the center of wing area (and therefore the center of wing weight more or less) much farther back than a straight wing. This meant that the engines, which are the heaviest concentrated weight in the airplane, had to be placed well forward of the wing. Boeing accomplished this by suspending four of the six engines in pairs on struts projecting forward from the wing.

Another method of combatting compressibility is the use of very thin wings (12-10-8% sections). These also pose construction problems due to lack of space inside them for structure. Boeing solved this problem in two ways: first, two of the jet engines were mounted out near the wingtips (taking their weight out of the wing-fuselage joint); second, permitting a degree of flexibility in the wing in such a manner that the wings have a slight "droop" to them on the ground and a slight "gull" to them in the air. A third Boeing solution was installation of the landing gear entirely within the fuselage because there was not room in the wings for the large wheels required.

The XB-47 has a span of 116 ft. and is 108 ft. long. It is powered by six General Electric TG-180 (J-35) turbojet engines producing 4000 lbs. of static thrust each, or a total of 24,000 lbs. of thrust for the airplane. This is the equivalent of 48,000 hp at a speed of 760 mph, the speed of sound. But this isn't all: a series of *eighteen* rocket-powered JATO units are mounted in the after fuselage, each producing 1000 lbs. of thrust for a short time. This is an additional 36,000 hp, or a total of 84,000 hp on the XB-47 at sonic speed. If the speed of sound is a wall, and if Boeing engineers desire the XB-47 to blast through it, then it certainly has ample power for the job. However, the giant new bomber is not a supersonic nor a sonic speed airplane. It has a design speed of about 630 mph, well below the speed of sound but well up along the Mach number chart towards sonic speed. Boeing research engineers have tested a model of the XB-47 to a speed of Mach number 0.95, which is considerably faster than any piloted airplane has yet traveled.

The giant XB-47 weighs about 62 tons and carries 15,000 gals. of jet fuel, enough for a range of 2000 miles. Yet, it has only three crew members: pilot, co-pilot and bombardier. Actually their duties aren't as simple as they sound for the XB-47 is radar-navigated, its bombs radar-aimed and released, and its lone armament—

two .50 cal. machine guns in the tail—radar-controlled. This makes the whole crew radarmen, so to speak, with the pilot following his radar scope on the bombing run, the co-pilot following any pursuing enemy fighters by radar, and the bombardier following his radar 'scope for the release of his bomb load. That bomb load may be Uncle Sam's big 22,000 lb. bomb, or as many pounds in smaller bombs, and most engineers believe the fantastic 42,000 lb. bomb recently announced could be carried (partially externally) by the XB-47 over a reduced range.

Boeing engineers have missed no bets for additional miles-per-hour out of their new bomber, and close observation of the accompanying pictures will reveal that a special finish on the leading edges of the XB-47 have been provided. This finish is a special handmade super-smooth coating placed over the wing, engine nacelles, fuselage and tail surface back to their thickest point to insure that the air will flow smoothly at least back to that point. Since little can be done to preserve laminar flow past these thick points, natural finish has been used from this point aft.

Designing and building this radical new bomber was a big job—but flying it is another tough assignment. Boeing's veteran test pilots Robert Robbins and Scott Osler, who were tabbed for the job, trained seriously for it since the day the airplane was first conceived. This included test flying of P-80 *Shooting Stars* to get the "feel" of jet planes, ejector seat firings at Wright Field to experience this sensation in the event the ejector seats of the XB-47 have to be used, and "flying" the bomber in a special dummy device located at Moffet Field. Both have experienced JATO takeoffs and have flown B-29's and *Stratocruiser* transports.

The mighty XB-47 is something entirely new in aviation and, as such, will provide an invaluable guinea pig for all of its different phases: research near the speed of sound, tactical maneuvers with opposing jet fighters, structural and aerodynamic tests of practical aircraft as large as this which fly this fast, and perhaps most important of all in these troubled times in the international sphere, entirely new strategic concepts of Air Power as a near-sonic striking force.

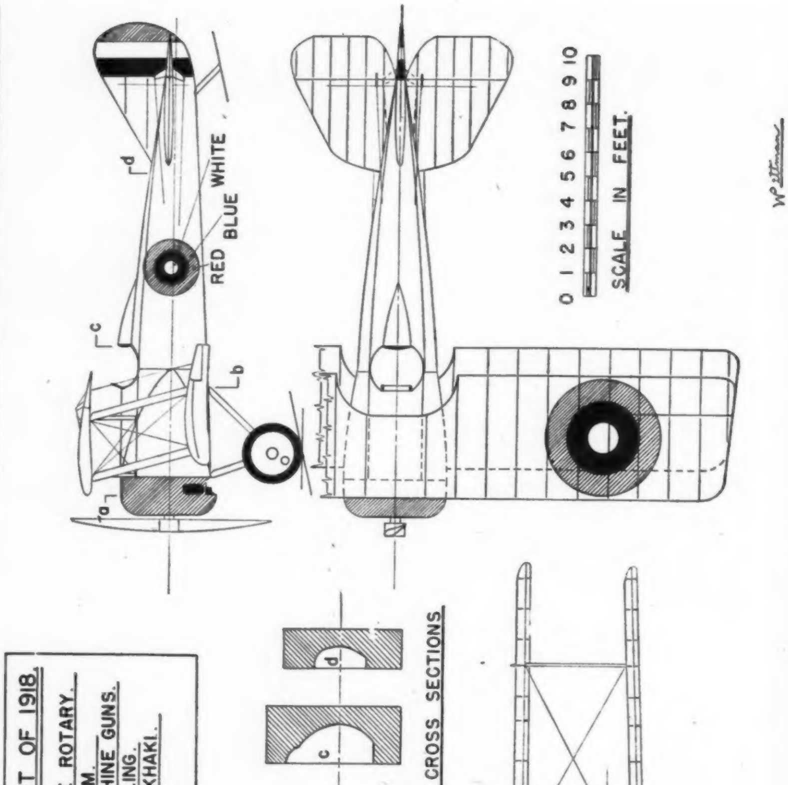
Batteries for Radio Control

(*Continued from page* 29)

is placed in the cell, the cell must be kept in a charged state; otherwise sulphation will occur, rendering the cell useless.

A fully charged lead acid cell, such as used for model work, loses 1% to 1-1/2% of its charge per day if left in an unused state. If once charged and then left idle, a wet battery should be charged at least once every two weeks to keep it in good condition. Cells have gone as long as 30 to 40 days between chargings, but this is not generally recommended. Vitamite batteries, by tests, have a life cycle of around 300, which means they are good for that many rechargings. Since a penlight cell is not rechargeable, the life span energy of the aforementioned wet cell is equal to the energy expended by the amazing total of 600 penlight cells. Thus it can be readily seen that a wet type cell will last longer than a comparable dry cell under the same conditions.

Modelers probably will obtain more information from the charts and diagrams



than from a thousand more words. So in closing, here is a brief summary:

Be sure your batteries are fresh. Check them with a voltmeter, preferably while under load.

Do not attempt to draw too high a current from your cells or batteries unless economy is secondary.

Do not overheat your batteries and expect them to be normal when the temperature again becomes normal. Overheating a cell or battery, either by raising the external temperature or employing excessive drain, will lower the cell capacity. Store your cells in a cool place.

When using "wet" cells, keep them in a charged condition. If left uncharged, after the electrolytic has been added, sulphation will occur and the cell will be damaged.

Whenever possible, use boosters. Be sure to observe polarity when connecting boosters. Positive terminal of booster must be connected to positive terminal of flight cell or battery, and negative terminal connected to corresponding negative terminal.

Remember, cells connected in parallel give far longer life than individual cells.

This article has dealt principally with radio control receiver power sources, and although the author is a firm believer in the bright future of radio control, there is still a considerable amount of work to be done in this field. The more modelers who take up this interesting phase of building the faster and better it will be developed.

Comments on Battery Drain Chart.

All life tests were continuous under full load except for the 22-1/2 or 45 volt "B" batteries, which were computed on a 12 hour per day basis. End point voltages were taken to a conservative 1.1 or 1.2 volts per cell instead of the regular 1.0 or 0.8 volts per cell. A high end point voltage was used for the chart so as to take care of critical circuits or components where a lower voltage cannot be tolerated.

Winning Free-Flight Gassie

Study the plans for the 1947 NATIONALS CLASS C OPEN winner in the February issue of this Magazine. This ship won the event and the *Model Airplane News Trophy* for its designer and builder, Jerry Brofman.

Air Ways

(*Continued from page 27*)

and is powered by a *Super Cyclone*. Its diameter is 20" and it has a symmetrical airfoil. On the first flight test a small rudder was used, but it was removed on the second flight, and it was found that the ship flew just as well as before. It has been flown with the motor running very slow, yet it attains a speed of 50 mph and has an exceptional glide (about 3/4 of a lap). The *Flyin' Saucer* is very stable but still quite maneuverable.

Elmer R. Cox, 1911 George Washington Blvd., Wichita, Kans. produced the ship in No. 3 which is a combination of talent and imagination. It is powered by an *Ohlsson 60* and is giving wonderful results. It is a dolly takeoff type.

Ensign James Tangney, Treasure Is., Calif. contributed No. 4, a trim Aussie gas job. When Ensign Tangney visited Australia he attended a meet and met several of the leading Australian modelers. He was impressed with their fine work and sent us this picture of one of the Australian boys with his model.

No. 5 comes from Gordon E. Codding, 942 So. Gramercy Dr., Los Angeles 6, Cal. This jet powered flying wing called the *Jet-Wing*, has 5' 4" span and was inspired by J. K. Northrop. Several of its characteristics are: a *Minijet* engine on stainless steel mounts, and gas tank in wing with a provisional shut-off system using a mouse trap and Austin timer which pinches the fuel line. Although no power flights have to date been made, the hand and towline launched glides show very good balance and positive control. Airfoil at centerline is symmetrical, root rib at main gear legs is U.S.A. 27 top with slight under-belly changing to symmetrical at the tips; included is the usual 2° negative twist at tips. The C.G. is at 1/3 of the jet tube and center rib, and lies on the chord line. Centersection is semi-monocoque of sheet aluminum skin with two heavy plywood spars. Wing is set at 2-1/2° positive relative to thrust line of the jet; gap between jet and wing is sufficient for venturi effect cooling. Air wheels are mounted and main legs have telescoping struts with spring shocks. The outer panels are of conventional construction; hardwood spars, balsa ribs, tips and edges, sheeted leading edge silk covered, 5 coats aluminum dope, old style A.A.F. stars and "U.S. ARMY" lettered on bottom. Weight is 2-1/2 lbs. Estimated speed 35-40 due to thick wing and wheel drag.

Edward E. Lindahl, 120-16 201 Pl., St. Albans, N.Y. submitted No. 6. This model is powered by the *OK CO2* engine and is of simple construction, requiring but one week of spare time to complete it. It was constructed primarily to study the operation of the little engine, which was found to be well constructed and reliable. A test period during which over thirty flights were made indicated the following characteristics: the thrust for the first 10 or 15 seconds is far greater than could be obtained by an equal weight of rubber; power falls off so sharply through the remainder of flight that a model weighing but 4-1/2 oz. will not maintain its altitude. As a matter of fact, many of the flights ended with the plane coming to earth with the engine still turning over. Engine efficiency is a function of the outside air temperature. The *OK* engine is of the thermal expansion type. As such, the CO2 gas released from the high pressure capsule tends to expand very rapidly. The higher the outside tempera-

ture, the greater will be the degree of expansion. The longest flight was 3 min. 5 sec.

The *Sailwing 50*, built by Wallace P. Howell, Richland, Wash. is shown in No. 7. This is a gas powered experiment in flying wings. Wingspan is 100" and the model is powered by a fully-cowled *Super Cyclone* motor which is cooled by a curved passageway in the bottom of the fuselage. It takes off very nicely after about a 15' run, and climbs steadily at about a 30° angle. There is no tendency to oscillate, power stall or spiral in. The maximum altitude on a 20 sec. motor run is 400 to 500 ft. The glide is flat and fast with a fairly high rate of sink. Landings are smooth and 3 point. The nose gear is exceptionally sturdy and stood up well during preliminary flight tests and glides, although it took quite a beating. The color scheme is predominantly insignia red. However, the rudders are orange-yellow and are centered on a 1" band of the same color which passes completely around the wing. There is also a 1" band of delph blue on each side of the orange-yellow.

Albert C. Smith, 464 S. 9 St., San Jose, Calif. sent us No. 8, a Columbia XJL-1. It spans 49" and will be powered by a *Super Cyclone 60* swinging a four bladed 8" prop when he gets the interior finished. This model is a control line job.

The *Gas Champ*, shown in No. 9, was built by Albert Cooper, 67 Melrose Ave. S., Hamilton, Ont., Canada. One of the particular features of this gas job is its covering which is entirely Nylon. The model is practically puncture proof, yet is not very heavy. The powerplant is an *Ohlsson 60 Custom*. Total weight is 3 lbs. 7 oz., and the average time is 2:18 using a 20 sec. engine run.

The *Ercoupe* rubber job in No. 10 comes from Anton E. Arnoste, 4744 N. Larkin St., Milwaukee, Wis. The ship is covered with silver tissue with a black anti-glare panel. Mr. Arnoste claims this is one of the most dependable ships he has ever flown, apparently improving with age.

To disprove Rudyard Kipling's theory concerning East and West, we are pleased to publish Alfred Wong's "Wakefield" in No. 11. Mr. Wong is a student at the University of Hong Kong. His model's wingspan is 45"; overall length 38"; wing section is modified R.A.F. 32; stabilizer section is Clark Y; folding prop 17-1/2"; power is 12 strands of 1/24 rubber. Setback wings were used, and slab-sided body was made up of 1/8" balsa.

No. 12 is framework of a rakish looking speed model built by Ronald Walker, 40 Cobham Ave., Liverpool, England, who unfortunately gave no details of performance or design.

NEWS OF MODELERS

Charles V. Page, 144 Gt. Northern Rd., Woodside, Aberdeen, Scotland is a solid scale enthusiast and would like to correspond with anyone who has an extensive range of 1/16 or 1/4 in. scale plans.

Tommy McDonald, 305 Summit Ave., Pasadena 3, Calif. is anxious to become acquainted with a boy around 16 who is interested in control line and free flight.

John J. Fox, Spartan School of Aeronautics, Dorm No. 3, Tulsa, Okla. formerly lived in Poughkeepsie, N. Y. and has a yen to correspond with a fellow modeler from that section.

Karl Gunnar Knutsson, 27 B Lastmakaregatan, Stockholm, Sweden is the Penfriend Editor of *Flyg*, official organ of The Royal Swedish Aero Club. He has invited our readers to take up correspondence with people in Sweden, Denmark, Norway and Finland. If you are interested give the following information when you write to Mr. Knutsson: name and address (in block letters), age and sex, interests within aviation, other interests and hobbies, in which country or countries pen friends are wanted, language to be used.

Miles Myers, Rosetown, Sask. is in need of a little advice in the field of gas modelling. He would like to correspond with U-Control gas modelers in the U.S. aged 14-17.

Kenneth C. Eglit, 53 Margaret Road, New Baruet, Herts., England would like to obtain a kit (by exchange) of a World War I control liner, or would even appreciate a set of plans to do the job.

James W. Kiehl, 542 E. 129th St., Hawthorne, Calif. is eager to learn of a reader in Germany who wishes to contact an American. He also offers to exchange magazines with a person interested in the same general subjects. Mr. Kiehl reads, writes and speaks German.

Charlie Folk of Hampton, Va., receiving high point trophy from H. Lester Ritchie, Contest Director, at 2nd Annual Dixie Championship

P. C. Stevens, 18 Beresford Rd., Chingford, London E 4, England desires to have a pen pal, about 23, interested in all aspects of power design and flying and who would like to exchange books.

Guiseppe Gotterelli, Amociasione Aeromodellisti Bologuer via Rissoli 4, Bologna, Italy, would like to exchange an Italian Supertigre Diesel engine for an equivalent American U-Control engine.

CLUB NEWS

Alaska

S/Sgt. Thomas U. Kirley of the Air Corps sends word from far north Anchorage that a branch of the AMA, called the *Alaska Model Ass'n*, is a very enthusiastic and industrious outfit. In spite of adverse weather conditions, hardship in getting decent supplies and many other discouraging situations that would dampen the spirits of other less hardy groups, the 25 active members keep the flame of model airplane building burning. The club holds at least two big contests (approx. 50 contestants) per year—one in summer and one in winter. Through the efforts of Col. Mosley, Commanding Officer, the meets are held in the main hangar at Fort Richardson. More power to the stout hearted members of this pioneer organization.

California

The U-Control contest held at the ball park in Ukiah on September 1 was acclaimed by all present to be the finest get-together of modelers Northern California ever has held. Gene Learnard, of Gene's Hobbies in Ukiah, and organizer

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of the *Ukiah Modeleers* club, with the able assistance of Don Nassie and Don Crawford had everything in readiness for the meet. The winners:

Speed

Jr. Class A—No entries
Sr. Class A—1. W. Richards 2. J. Sumner 3. J. Lenderman
Jr. Class B—1. L. Mallory 2. C. Hallum
Sr. Class B—1. B. Passarino 2. W. Richards 3. H. Puckett
Jr. Class C—1. L. Douglas
Sr. Class C—1. A. Flanders 2. K. Adams 3. R. Shelton

Precision

Jr. Class A—1. B. Thundberg
Sr. Class A—1. R. Regalia 2. J. Sumner 3. H. Puckett
Jr. Class B—1. B. Thundberg 2. J. Douglas 3. J. Harvey
Sr. Class B—1. R. Regalia 2. K. Skilling 3. R. Arista
Jr. Class C—1. J. Douglas 2. E. Barefield 3. J. Harvey
Sr. Class C—1. R. Mayes 2. B. Hopper 3. F. Bradford

Scale

1. J. Smith 2. R. Regalia

Novelty

1. W. King 2. J. Smith 3. S. Bundesen

Team

1. Thundberg & Skilling 2. Bradford & Butman 3. Tucker & Schulman

* *

The *Eureka Strato Skippers* held a big Ul-Control contest in November.

* *

For the second time this year the *Peninsula Prop Twisters* of San Mateo held an All Precision meet at the San Mateo ball park on Sept. 7. Complete results are:

Precision

Jr. Class A—1. C. Bekins, 2. D. Hollfelder 3. R. Lane
Sr. Class A—1. Ray Regalia 2. J. Sumner 3. B. King
Jr. Class B—1. D. Hollfelder 2. C. Hallum 3. L. McKown
Sr. Class B—1. A. Griswold 2. R. Arista 3. J. Smith
Jr. Class C—1. H. Smith 2. C. Bekins 3. L. McKown
Sr. Class C—1. A. Simms 2. D. Vis 3. B. McReynolds

Appearance

J. Waterman

Team

Vis and Nickel

Scale

1. C. Bussard 2. R. Regalia 3. C. Bussard

Women

1. B. Santina 2. M. Kultman

Novelty

1. H. Yonkers 2. Ingersoll 3. S. Bundesen

* *

The *Bakersfield Gas Model Airplane Assoc.* held a meet on Oct. 12 at the Poso Creek Airfield. Results:

Junior Event

Class A—1. Ken Newbeiser 2. Ray Acord 3. Ronald Mosier
Class B—1. Pat Regan 2. Bill Kececk 3. Henry Vincent
Class C—1. Ralph Oberg 2. Paul Gillian 3. Milton Ronney

* *

Here are the results of the *Los Angeles Aeromodelers* U-Control Contest held Oct. 5:

Speed

Class A—1. Newberger & Sharp 2. Frank Keb 3. Paul Conrad
Class B—1. Jim Whitlatch 2. Bob Behren 3. Roger Williams
Class C—1. Keith Storey 2. Dick Grandell 3. Newberger & Sharp
Junior—1. Bob Behren 2. Dick Grandell 3. Frank Keb

Precision

Senior—1. Don Gulotta 2. Bud Jamison 3. Bob Brown
Junior—1. Jack Gilroy 2. Jim Milbeck 3. Dwight Miller

Ladies' Precision

Bunny Baldree

Scale

W. Jackman 2. Cedric Galloway 3. E. E. Russell

* *

A model plane building contest is being conducted at U. S. Naval Air Station, Los Alamitos. Entries will be models of combat type aircraft presently in use at this base. Elimination flight tests will be conducted and prizes awarded.

* *

Winners of the Stockton Piston Pushers

U-Control Contest held July 27 are:

Speed
Class A—1. Mel Anderson
Class B—1. E. Huth
Class C—1. Albrecht and Alexander

Precision
Class A—1. Ray Regalia
Class B—1. Bill Thundberg
Class C—1. Ed King

Sweepstakes Award
Ray Regalia

* *

A Model Airplane Contest was presented by the *Anaheim Balsa Butchers* at La Palma Park on Sept. 28 with these results:

Open Precision
1. Ed Lansberg 2. Don Gulotta 3. J. C. Yates

Speed
Class C—1. Keith Storey 2. Newberger and Sharp

Open
Class A—1. Ed Sharp and Newberger 2. Keith Storey 3. Harold Tye
Class B—1. Keith Storey 2. Newberger and Sharp 3. Louis Rogers

Junior
1. Jack Gilroy 2. Bob Keich 3. Jim Melbeck
Class B—1. Ray Benskin 2. Bob Keich 3. Al Wadleigh
Class C—1. Parker Hubert, Jr. 2. Ray Benskin
Class A—1. Bud Jamison 2. Dick Grandell

Scale
1. Bob Palmer 2. Bob Brown 3. Newberger and Sharp

Ladies Event
1. Bunny Baldree 2. Beverly Cosens 3. Louise Apalski

Team Stunt
1. Don Gulotta and Ed Abacherle 2. Bob Palmer and J. C. Yates 3. Bob Brown, Ed Lansberg and Bud Jamison

* *

Connecticut

Flite Timers' Medal Aero Club of Southington, sponsored by the Southington Exchange Club, ran a gas model meet on October 19 at the Southington airport. Frank Bushey, A.M.A. coordinator for New England, assisted with arrangements.

Illinois

Although model flying in Southern Illinois has been prominent for years, Byrd Furlong writes us that the *Marion Sky Devils* is the first club that has been organized. The club was started in March 1946 by Mr. Furlong who tells us that competition and activity are the club's main interest.

* *

Following are the results of the Lou Clemens Memorial Contest held in Naperville on Sept. 7. The meet was sponsored by the local American Legion post and was given by the *Nap-Air-Villains* club:

H. L. Glider—1. B. DeBatty 2. R. Giest 3. Wickman
Rubber—1. E. Lidgard 2. W. Erlich 3. D. Deshick
"A" Gas—1. Balender 2. Weiler 3. Vanderbeck
"B" Gas—1. Muhs 2. Heminger 3. R. Lawrence
"C" Gas—1. D. Campbell 2. J. Kempter 3. D. Hess

* *

Results of *Pretzel Gas Model Club's* 4th Annual U-Control Contest held August 31 at Krape Park:

Speed

Class I—1. Richard Swenson 2. Nathan Bast 3. Robert Wood
Class II—1. Richard Swenson 2. Nathan Bast 3. Harold Dublin
Class III—1. George Sweet
Class IV—1. Gordon Wisniewski 2. Henry Cherwiznik 3. William Terrill

Stunt and Precision Event

1. Robert Meecher 2. Harold Dublin 3. Jerry Lippins

Scale Event

Jerry Lippins

Jet Exhibition

Merle Koebernick

Gate Prizes

1. Robert Wood 2. Maurice Keene

Special Award

Richard Swenson

* *

Kansas

We think this is an interesting item from *Dope Fumes*: "*The Flying Eagles*' Chapter of *Hy-Flyers* held their annual Junior and Senior Control Line Model Meet Sept. 28 and a great phenomenon occurred. An hour after the contest opened, the prevailing hurricane of Kansas died to a mere whisper, and happy modelers from all over the city of Wichita flocked out to Jake's Hobby Bowl to get in a few 'officials' and possibly take home some hardware." The winners:

Class 1, Jr.—1. John Williams
Class 2, Jr.—1. John Williams
Class 3, Jr.—1. John Williams 2. Everett Gray 3. Rene Forrester
Class 5, Jr.—1. Ken Andrews
Class 1, Sr.—1. Harold Young
Class 2, Sr.—1. J. Shumaker
Class 3, Sr.—1. Harold Young 2. David West 3. Frank Stoss
Class 5, Sr.—1. J. Shumaker
Class 6, Sr.—1. J. Shumaker 2. Harold Young
Stunt, Jr.—1. Joe McClelland 2. Jerry James 3. Ted Sandberg
Stunt, Sr.—1. Harold Young 2. Dave West 3. Frank Stoss

* *

Maryland

The Model Airplane Clubs of Baltimore City recently put into operation a new over-all governing organization to be known as "The Baltimore Congress of Model Aeronautics." The aim of this unit, composed of delegates from all the represented clubs, is to more closely coordinate the activity of the members of the respective clubs and to provide a more powerful bargaining unit for the advancement of model aeronautics in the state. To present this new organization formally to the public, two Model Meets were held October 26 and November 2 of this year; these were Control Line and Free-Flight Meets respectively.

* *

Massachusetts

George H. McGinnis, Publicity Manager of a U-Control club writes us that his

group holds meetings every Wednesday at 7:30 p.m. at Bill's Model Shop, 61a Franklin St., Allston. They have been flying every Sunday at a local cinder path. Once a month motion pictures on items about flying are shown by one of the members. (Say, you Allstonites, how about dreaming up a name for your club?) At a recent meeting the following officers were elected: Bill Ellis, Pres.; Hugh Range, Sr., Treas.; George Kaiser, Sec. New members are welcome to join the club at all times.

* *

Missouri

The Annual Meeting of the Mid States Model Aeronautical Assoc. has been scheduled for Saturday and Sunday, January 3-4. The meeting will again take place in the Hotel Continental, Kansas City. Cost of the meeting itself will be $3 per person. If you have any suggestions regarding the program, or if there are any suggestions as to what you would like to have covered at this session, please drop a line at once to C. O. Wright, 315 W. 10th, Topeka. This is the Third Annual Meeting of the MidSMAA organization.

* *

Nevada

Results of the 2nd Annual Western States Contest at Las Vegas are:

Speed

Class A—1. Newberger
Class B—1. Newberger 2. Worthen 3. Thompson
Class C—1. Newberger 2. Benskin 3. Churchill
Class B Jr.—1. Benskin 2. Hollaway
Class C Jr.—1. Benskin 2. Gilroy
Class A Sr.—1. Mahieu
Class B Sr.—1. Mahieu 2. Landsberg
Class C Sr.—1. Mahieu 2. Hollaway 3. Gullotta

Scale

Open—1. Wright

Junior—1. Alexander
Senior—1. Gulotta

Stunt

Open—1. Landsberg 2. Morgan 3. Curnett
Junior—1. Gilroy
Senior—1. Gullotta 2. Brown

Team Stunt

1. Burbank Team 2. SNAFU Team

* *

New York

The First Annual U-Control Contest, sponsored by *Long Island Model Flyers*, was held at the Freeport Municipal Stadium on October 12.

* *

Joseph H. Pira, new Publicity Director of *Screamin' Demons* of Long Island, is keeping us up to date on the club's many activities. They are sponsoring a plan whereby, with the aid of Long Island Clubs and local authorities, they hope to impress the State with the importance of model flying. By doing so they hope to obtain a permanent flying site and have asked the cooperation of M.A.N. in publicizing their efforts. It is a pleasure, *Screamin' Demon* members, to do what we can for this worthy cause. Also, on October 5, five members participated in the Eastern Championship meet held by the *Brain Busters* of Hampton, Va. and came home carrying some of the hardware.

* *

North Dakota

On September 27 and 28, the *Missouri Slope Model Airplane Ass'n* of Bismarck held a U-Control Contest at the local Municipal Airport. The contest was sponsored by the merchants of Bismarck and was considered to be very successful by the local and out of town contestants. Contest directors were Harrison Monk, Scout Leader of the Airscouts; Art May, Leader Member of AMA; Harvey C. Larson, Secretary of the Missouri Model Club. The Grand Champion winner was Bob Lien of Hillsboro who clocked 77 mph in the speed event. Second place was won by Bob Warming of Bismarck. Special attractions of the contest were dual flights by Bob Lien and Gerry Spies of Mayville. Harvey Larson, 908 2nd St., Bismarck will be secretary for the *North Dakota Model Builders*. All modelers are urged to send their names and addresses to him so they can be entered on the contest mailing list for the coming season.

* *

Oregon

The following are the results of the Salem "Cloud Chasers" contest held October 12:

Free Flight Gas—Classes A, B and C—1. Doctor Nichol 2. Rex Bently 3. Elmer Rothe
Rubber—1. Ed Knapp

* *

Utah

The 9th Annual Trophy Contests sponsored by Douglas Models Co. of Salt Lake City and covering three days, August 30 through September 1, made history in the Intermountain States when more than 200 planes entered by over 125 contestants competed. The First Annual Douglas Model Aircraft Banquet was held in the Newhouse Hotel Ballroom on the evening of September 1, at which time the Douglas Trophy Intermountain Empire Championship awards were made. The winners:

Gliders

Open—1. Doug Besselievre
Amateur—1. Ted Samuelson

Free Flight Gas

Jr. Class A—1. John Badertscher 2. Tom Hoopes
Jr. Class C—1. Owen Jacobsen 2. Tom Hoopes 3. Doug Besselievre
Amateur Class A—1. Ronald St. Jean 2. Ray Schofield 3. M. J. Samuelson
Amateur Class B—1. Ronald St. Jean 2. Lee Sherman 3. Ted Samuelson

Amateur Class C—1. Bill Witt
Open Class C—1. Ray Newey 2. Hal Yeager 3. Bob Denny

Control Line Scale
1. Gene Millerberg 2. Harold Johnson 3. Doug Besselievre 4. Jay Lewis

Control Line Stunt
1. Bob Palmer 2. Jerry Stunf 3. Bob McCullough

Control Line Speed
Class III—1. Jay Jackson 2. Paul Elieson
Class IV—1. Anton Millet
Class V—2. J. R. Babbitt
Class VI—1. Ralph Bovy 2. Anton Millet 3. Hal Yeager

Virginia

Here are the results of the 5th Annual Championships for Hydro Flying held in October at Hampton and sponsored by the *Brain Busters* Model Club:

Hydro Rubber
1. Fritz Breisch 2. Jack Kinzler 3. George Perryman

Hand Launched Rubber
1. Austin Leftwich 2. Ray Dietz 3. Fred Taub

Hydro Gas
1. Paul Salake 2. Everett Forehand 3. Max Faget

Hand Launched Gas
1. F. W. Smith 2. Joe Pira 3. John I. Smith

Washington

Skippy Witt, who calls herself a former girl outcast in model building, is secretary of a newly organized model club in Tacoma called the *Clover Park Cloud Clippers*. The club welcomes girls (emphasis on *girls*) and boys who show an interest in flying and have built at least one plane—glider, rubber or gas.

* *

On August 10 the *Olympia Miniature Aircraft Club* (OMACS) sponsored its annual free flight contest at Rainier Prairie. Secy. Allyn Johnson writes that the Prairie is considered by many to be the best free flight area in the Puget Sound region. The winners:

Class A Jr.—1. Richard Larson 2. John Feuz 3. Norm Baronsky
Class B Jr.—1. Stan Ryder 2. John Feuz 3. Morton Goldstein
Class C Jr.—R. L. Hammond 2. Don Lovell, 3. Loren Alfred
Class A Sr.—1. Marvin Stevens 2. Al Dippert 3. Fred Krury
Class B Sr.—1. Harold Folford 2. Owen Brown 3. Marvin Stevens
Class C Sr.—1. Chuck Hollinger 2. Ted Enticknap 3. Dr. Nichol
Scale—1. Ted Enticknap
Cross Country—1. Ted Enticknap 2. Tim Kingston 3. Marvin Stevens
Longest Flight of Day—R. L. Hammond

Autogiro Theory

(*Continued from page* 34)

area of 18 sq. in., fin surface, 12 sq. in., is 17" long with an 8½" tail moment and swings an 8" propeller.

Length of the rotor mast need be only as high as is required to provide proper clearance for the propeller, allowing a little extra for rotor blade "bounce." Coning angle of the rotor disk should be about 10 degrees.

The stabilizer may be mounted either above or below the thrust line but should have a slight positive angle relative to it and a negative angle of at least 7 degrees relative to the rotor plane.

The most important part of the autogiro is the rotor. A two bladed rotor is best because it is less subject to gyroscopic action, the blades interfere with each other to a lesser extent, and it is easier to build and balance.

A high degree of flexibility is paramount. Not only must the blades bend upward freely, they must also bend slightly circumference-wise and through their crossection as well. In other words the angle of incidence must be variable, depending upon wind pressure, yet firmly enough mounted to transmit most of the lift produced. If this condition is met the rotor blade will never slow down and

stop because it will rotate in the proper direction regardless of the direction of the relative wind.

If this sounds like a big order (and it is), happily the solution is quite simple, at least in models up to 36" disk. Such a rotor is depicted in Fig. 4. The spars may be bamboo, hardwood or wire, and the blades are simply *flat* wings of 1/32" sheet balsa. This rotor meets the requirements outlined above, yet what could be simpler.

As far as blade crossections are concerned the writer sticks out his neck with the observation that flat surfaces are as good as airfoils under 2½" chord, particularly since experiments with high camber sections have produced much flutter in conjunction with the necessary articulation. Besides, we have more than a sneaking suspicion that a rotor blade built as shown in Fig. 4 more or less makes up its own airfoil as it goes along, the curvature of which depends upon the speed of the rotor.

The rotor connection to the rotor mast must be very free and a slightly oversize bearing is better than a snug fit.

As far as the general planform goes it is well to have the CLA even with, or above, the CG. This makes the model less sensitive to gusts and makes the power-off "glide" steadier. Use of fairly heavy wheels to bring down the CG is sometimes helpful.

The axis of the rotor should be adjustable fore and aft because this is the most satisfactory method of trimming the model. If the model rolls to the left under power, increase the angle between rotor and thrust line; decrease it to correct rolling to the right. The model should balance at the rotor axis, and slight nose or tail-heaviness in flight may be corrected by varying the angle of downthrust.

Hot Shot

(Continued from page 25)

no drag inducing rubberbands in evidence.

The curved surfaces of the fuselage may be most easily covered if small pieces of wet Silkspan are used. The bottom of the fuselage is double covered to combat the puncturing effect of landings in sharp stubble. The wing and elevator should be fastened to a flat surface when being doped to prevent warping.

Three coats of thinned clear dope on the wing, rudder and elevators are sufficient to completely seal the covering. Two coats of clear dope and two of pigmented on the fuselage will produce a smooth finish, yet will not cause the covering to shrink so much as to bend the stringers between bulkheads.

Select a large field and a calm day for testing and adjusting the finished plane. Balance the ship by adding buckshot to the ballast box until a flat, slightly stalling glide is produced. Then adjust the ship to fly in left circles until it no longer stalls. All rudder changes should be made gradually, as the large rudder is quite effective.

When the plane is correctly adjusted for circling the first towed flights may be attempted. Use a towline of less than 100 ft. in length for the first flights (100 ft. is the A.M.A. contest length). Attach a tow-hook (a paper clip will do) to the end of the line and a small paper streamer about 6" from the hook. Engage the second tow-hook on the plane and have a helper hold the plane high and head it into the wind. Pull the ship out of the

helper's hands and tow it up slowly, so that you can get the feel of it.

On quiet days the rear tow-hook may be used to produce a rocket-like climb, while on windy days the front hook should be used for best control. With practice the ship can be towed directly overhead before releasing. The best method of release is to slacken the tow-line and let the ship fly off the tow-hook.

Another method of launching involves the use of a high-start. Contrary to common belief, a high-start may be used very successfully on large models such as this one. An excellent high-start may be made of two strands of 1/8" or 3/16" rubber, each 25 ft. long, attached to a 75 ft. towline.

The first few launches should be made with only a slight amount of tension in the rubber. By stretching the line farther each time, flights of maximum efficiency may be obtained. And the beauty of it is that you don't have to run to do it.

Flash

(*Continued from page* 2)

former newspaperman Steve Leo as Director of Public Relations, a job held heretofore by an Air Force officer, and observers predict that a civilian head of procurement and industrial mobilization planning is in the cards.

NEW AUTHORITY of the Air Force generals is seen in several important regional commands. Gen. Twining's command in Alaska includes all Army, Navy and Air Force units in the theatre and an Air Force officer is expected to hold a similar autonomous command in the Northeastern theatre, including Maine, Labrador, Canada and Greenland. Both of these outposts are prime strategic entrances to the U.S. target.

PRESIDENT TRUMAN'S Air Policy Commission rounded out one of the most thorough-going aviation hearings in history and retired to mull over the hundreds of pounds of testimony before preparing its report. The hearings covered every military and industrial leader in aviation and included flying trips throughout the industry, military bases and a trip aboard the carrier *U.S.S. Midway*. Led by Chairman T. K. Finletter, who impressed all those who testified with his quick and thorough grasp of current problems, the commission will recommend to Pres. Truman a basic Air Policy for his advice and guidanee. Next phase will be the hearings of the Congressional Air Policy Committee, created, political observers believe, to counteract any political gain Pres. Truman might have garnered from his commission. Both the military and industry are confident, however, that both groups will arrive at precisely the same recommendations insofar as both will have identical testimony to work from. The Congressional group, however, will have the final say insofar as they alone have the power to introduce and pass the required legislation. Regardless of which group produces the eventual changes, rest assured changes will be made and these will center about a five year procurement program sufficient to keep the Air Force and Naval Aviation prepared and the aircraft industry intact.

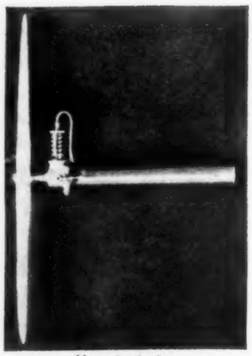
A GLIMPSE OF the future has been afforded by Flight Propulsion Research Laboratory of NACA at Cleveland. A recent "open house" revealed startling new developments in aircraft propulsion methods that make possible tremendous gains in aviation as quickly as the military can provide the money and the industry can build the equipment. On the basis of presently available data, the supersonic transport plane could be made available now, and design studies by NACA reveal that a 1500 mph transport with range of 2-4,000 miles carrying 10 passengers or equivalent cargo is practical. Revealed for first time was a supersonic compressor which does the work of several axial-flow

compressor stages in a single stage, thereby reducing weight and increasing efficiency. New fuels are available; metals are being used as rocket fuels because of their small volume in relation to heating energy. Boron and aluminum are promising as rocket fuels. To absorb the high heat of combustion, turbine wheels of "ceramel"—a composition of ceramics and metal—are being tested. Most promising new development is the nearing reality of the ramjet engine, a 16 in. type of which has attained a speed of 1,500 mph in missile tests.

NAVY JET SQUADRONS are now being formed, indicating successful wedding of the jet fighter with the aircraft carrier, a "couldn't-be-done" miracle of modern engineering. Navy is forming VF-17A and VF-18A at Naval Air Station Quonset Point, R.I., preparatory to going aboard the *U.S.S. Midway* and *U.S.S. F. D. Roosevelt.* These two squadrons will fly McDonnel FD11 twin-jet fighters. First Marine jet squadron, VMF-14B, will be commanded by Maj. Marion E. Carl, world speed record holder, who is now forming his group at Cherry Point, N.C. His unit will use FD-1's and North American FJ-1's as the latter become available.

IT IS AN all-too-rare privilege to record a military contract in these lean days but the Navy has just contracted with Glenn L. Martin Co. for 12 additional PBM-5A, world's largest amphibian. A previous order for 24 brings the total to 36 for the type. Deliveries will continue through first half of 1949.

FIRST FLIGHT of the Beech model 34 *Twin Quad* proved highly satisfactory and Vern Carstens, Beech chief test pilot, says she "performed like a veteran." The *Twin Quad* name comes from the fact that the model 34 is powered by four Lycoming engines buried within the wing driving only two propellers—thus, twin propellers driven by quadruple engines. The 20 passenger liner is designed to cruise at 180 mph with new lows in economy.



THE MATING OF the jet engine with the flying wing, long hailed as the "ultimate" form of the flying machine, is now a reality with the first successful test flight of the Northrop YB-49 Flying Wing powered by eight turbojet engines. The plane took off easily and climbed away rapidly from Northrop Field, and settled to earth ¾ hour later at Muroc Air Base. The flight proved a complete success, although marred by the loss of an accompanying P-61 *Black Widow* escort plane from which its 3 man crew parachuted to safety. The 500 mph YB-49 is essentially an XB-35 with a change in engines, but a major problem was presented by the fuel consumption of eight turbojet engines. This was provided for by utilizing every available inch of space for fuel. The slim size of the jet engines enabled the area formerly occupied by the two inboard P & W *Wasp Major* engines to be converted to fuel. Removal of the wing gun turrets also provided considerable extra fuel. All of this results in the YB-49 having a range only slightly less than half that of the XB-35, although the former has 100% more engines consuming 100% more fuel each. The YB-49 has a span of 172 ft., length of 53 ft., an empty weight of 88,100 lbs. and a gross weight of 209,000 lbs. The remainder of the B-35 contract (two XB-35's have already been delivered to Muroc) will have single-rotation, single propeller mounts, replacing the dual counter-revolving system that has proved so troublesome to date.

ANOTHER MAJOR manufacturer of personal aircraft—and also one previously producing only military aircraft—has decided to abandon the project. Republic Aviation Corp. terminated production on the famous *Seabee*, after producing 1060 of the four-place amphibians. The first production airplane rolled off the line July 31, 1946 and within a year production increased to 12 airplanes a day. About 50 *Seabees* are now at the Farmingdale plant awaiting delivery, and Republic announces that spare parts and service will continue available. Negotiations are now under way for sale of the design to another manufacturer, just as North American sold its *Navion* to Ryan.

STAND BY FOR the Bell XS-1 to make its long awaited attack on the sonic speed record. Two XS-1's are now at Muroc, one belonging to the NACA which will fly it at small speed increments, and the other the Air Force's in which Capt. Yeager, AAF test pilot, has made numerous flights, one up to Mach number 0.90. AF plans an immediate sonic flight attempt for publicity purposes following the Navy (and Marine Corps) success with the Douglas D-558. The AF XS-1 has been modified to counteract a strong diving tendency at high speed, first reported by Chalmers "Slick" Goodlin, Bell test pilot.

LATEST BRITISH JET FIGHTER is the Hawker N. 7/46 powered by a single Rolls-Royce *Nene* turbojet engine. The new fighter is of conventional design but varies in two exits from the jet engine lying at the wing-fuselage juncture along the trailing edge. The second Supermarine *Attacker* jet fighter has been completed and a third is nearing the end of the production line. The Air Ministry lists the sleek speedster at 590 mph top speed.

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HUNGER is a deadly thing and Americans must assist in the present worldwide emergency. Any contribution, whether it be a can of food or a ton of food, will be eagerly accepted by your church or community organization for shipment to hungry Europe.

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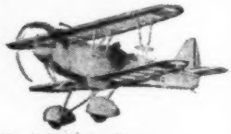

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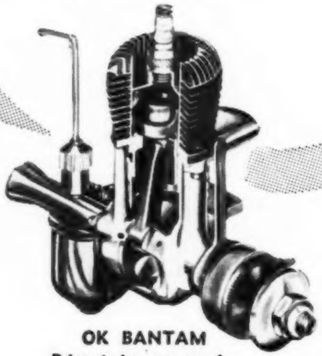

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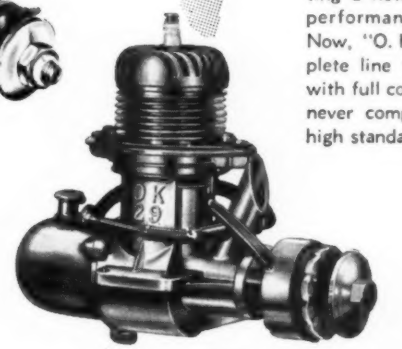

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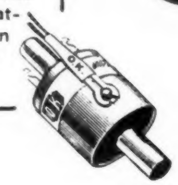

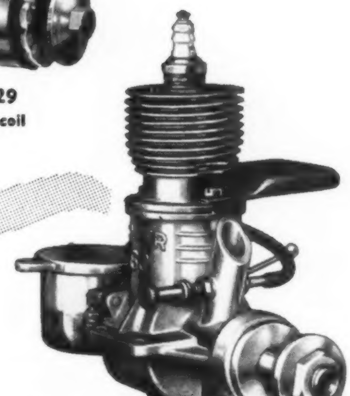

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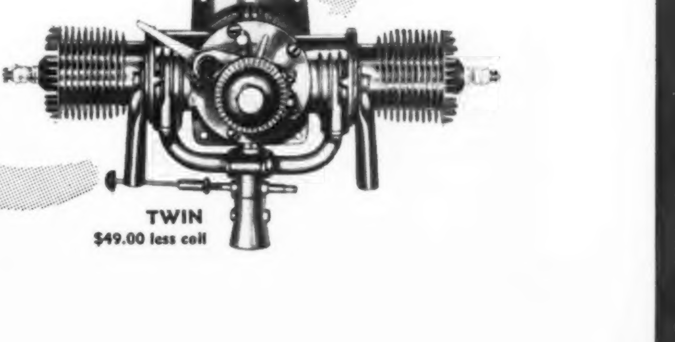

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